electronicsForYou EXPRESS

JANUARY 2023
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MUST READ

- ChatGPT: A Glimpse Into The Power Of AI
- "Non-Free Programs Are A Threat To Everyone's Freedom" — Richard Matthew Stallman
- Thermal Management System For Electric Vehicles
- 5 Interesting Reference Designs For Smart Homes/Offices

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it's an e-zine. we don't print it.

we publish only select editorial from the main magazine in XP.

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it's a typical FREEMIUM offering where you get to read our content (some of it) for free, and if you like it and want all of it, you pay for the print or ezine edition of the main magazine.

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we have seen subscriptions of the print and ezine editions go up month-over-month since the launch of XP in Oct 2020.

our overall readership of (selected) editorial and (all) advertisements has doubled.

last 4 editions of XP witnessed average readership crossing 2-plus lakhs on our website alone!

XP also attracts readers through JioMags, Magzter, Facebook and LinkedIN on top of those who read it on our website.

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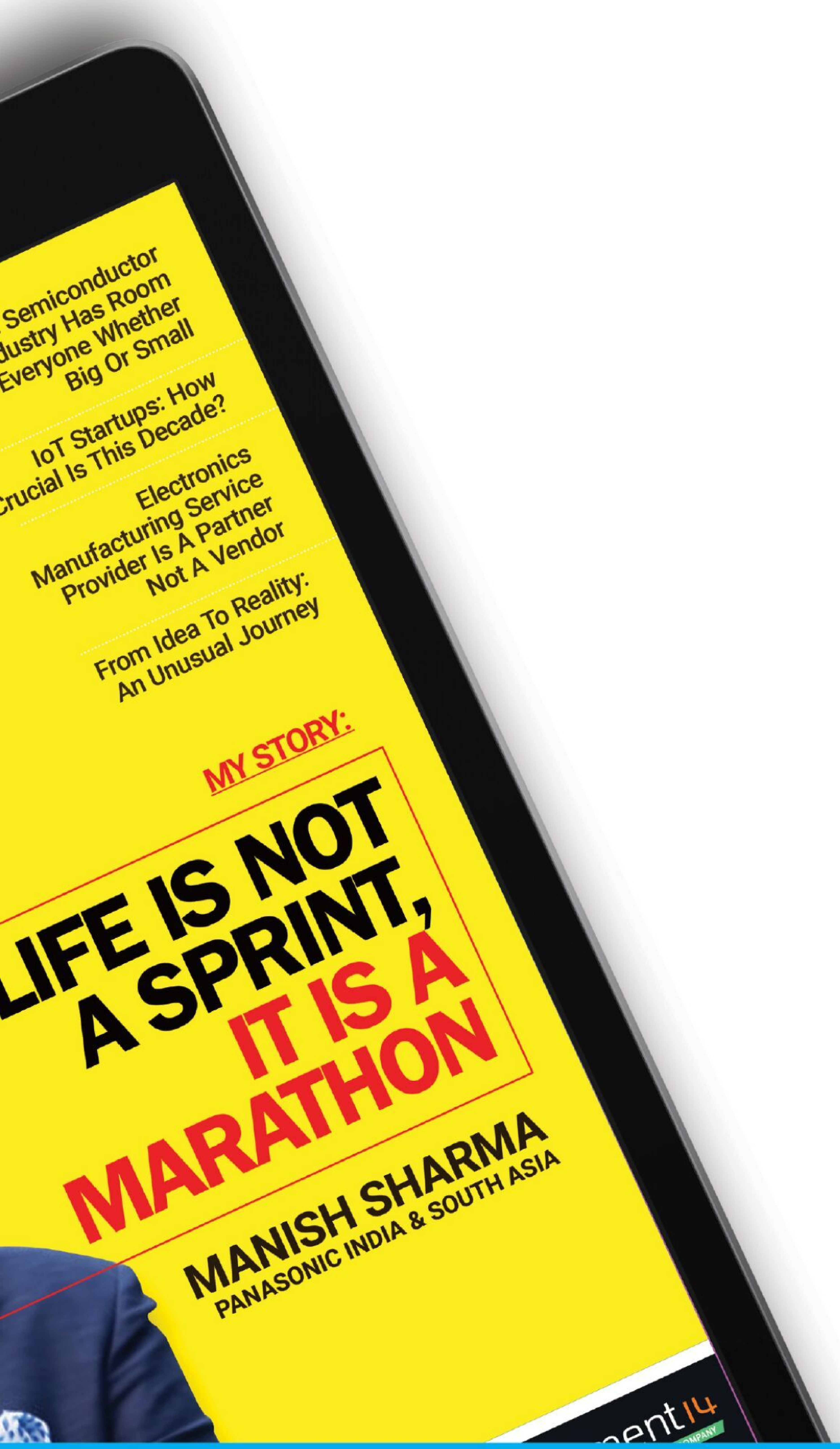
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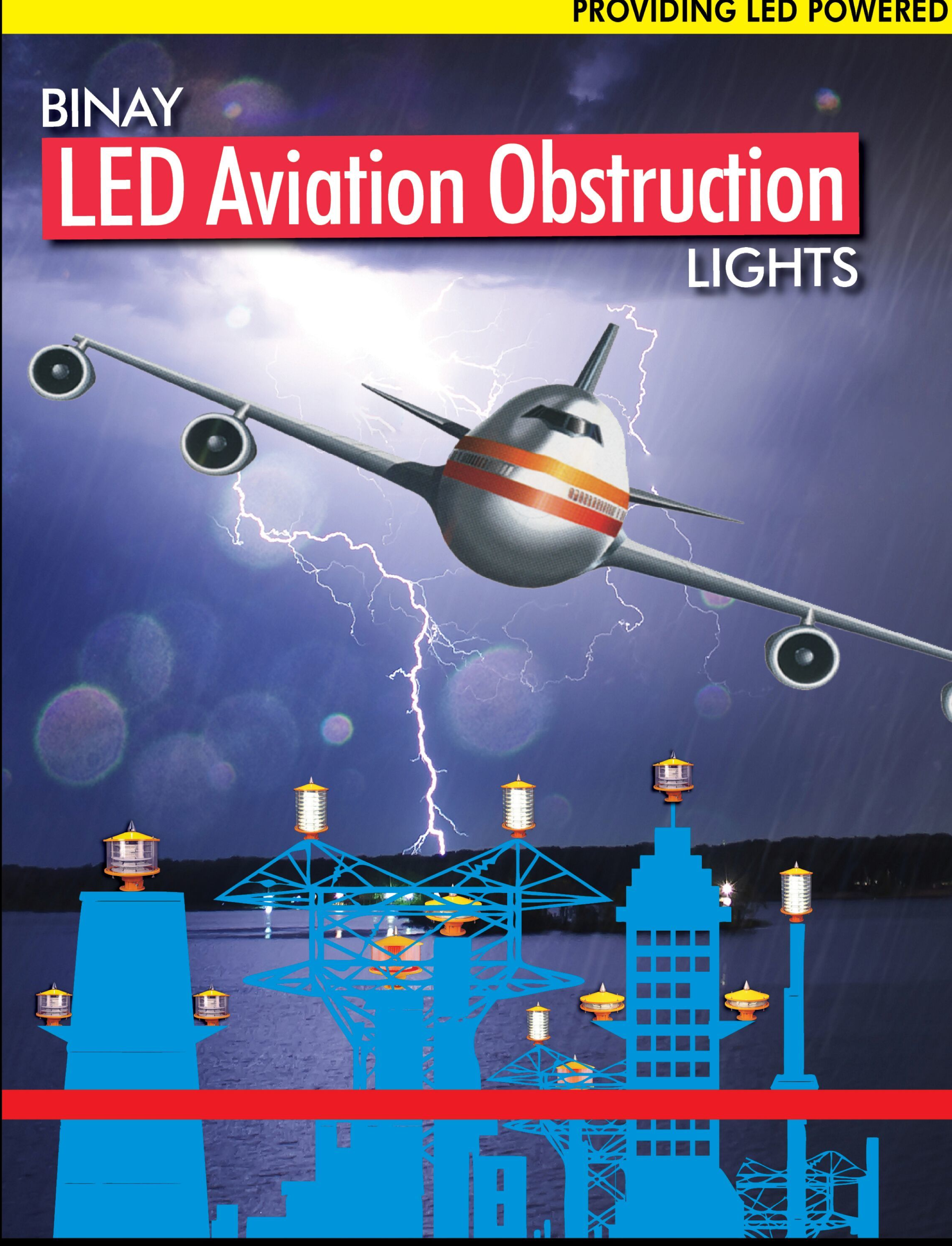
PROVIDING LED POWERED

BINAY LED Aviation Obstruction LIGHTS



TECHNOLOGIES SINCE 1983

BINAY LED-based HIGH, MEDIUM and LOW Intensity Aviation Obstruction Light Beacons

As per International Civil Aviation Organisation (ICAO) requirements Available in Low Intensity, Medium Intensity and High Intensity versions (as per International Civil Aviation Organization guidelines), BINAY's patented LED Aviation Lights come with 5-year/3-year warranties

DESIGNED, DEVELOPED, AND MANUFACTURED IN INDIA

High Intensity
200,000 candela
(Flashing White LEDs)

Medium Intensity
20,000 candela
(Flashing White LEDs)

Medium Intensity
2,000 candela
(Flashing Red
OR Fixed Red LEDs)

All BINAY Aviation Lights are based on Non-switching passive type circuitry (NO SMPS)

The circuitry incorporated inside the LED Aviation Obstruction Lights is passive electronic (solid-state) in nature, and does not use internal SMPS driver switching units to control the light unit. Internal LED current control is by non-switching electronic means only. No electrolytic capacitors are used inside the Aviation Obstruction Light unit.

The above is necessary to ensure reliability of the LED Aviation Obstruction Light. This system design effectively eliminates any active components and circuits inside the aviation light itself, and enhances the solid-state passive reliability of the LEDs (mounted in relatively inaccessible locations at the height of tall structures). This drastically reduces the possibility of component failure - and hence possibility of any maintenance requirement – in the LED Aviation Obstruction Lights themselves (which are mounted at extreme heights in the system).

The BINAY LED Aviation Obstruction Light offers the following advantages:

- Fit-and-forget maintenance-free operation
- A long life of 100,000 hours (20 years at 12 hours daily burning)
- Pays for itself within a short period of operation in the form of reduced installation, maintenance and servicing costs
- Quick Installation; Reliable operation 365 days per year
- Shock-proof and vibration-resistant
- Over-Designed Intensity to allow for natural LED intensity degradation over its operating lifetime

LED Obstruction Lighting for:

- Industrial chimneys and smokestacks
- Transmission, microwave and cellular towers
- Radio, TV and similar structural towers
- High-rise buildings and structures
- Airports and airfields

THE BINAY LED OBSTRUCTION LIGHT IS UNDER ACCEPTED PATENT, AND AS SUCH IS A PROPRIETARY PRODUCT

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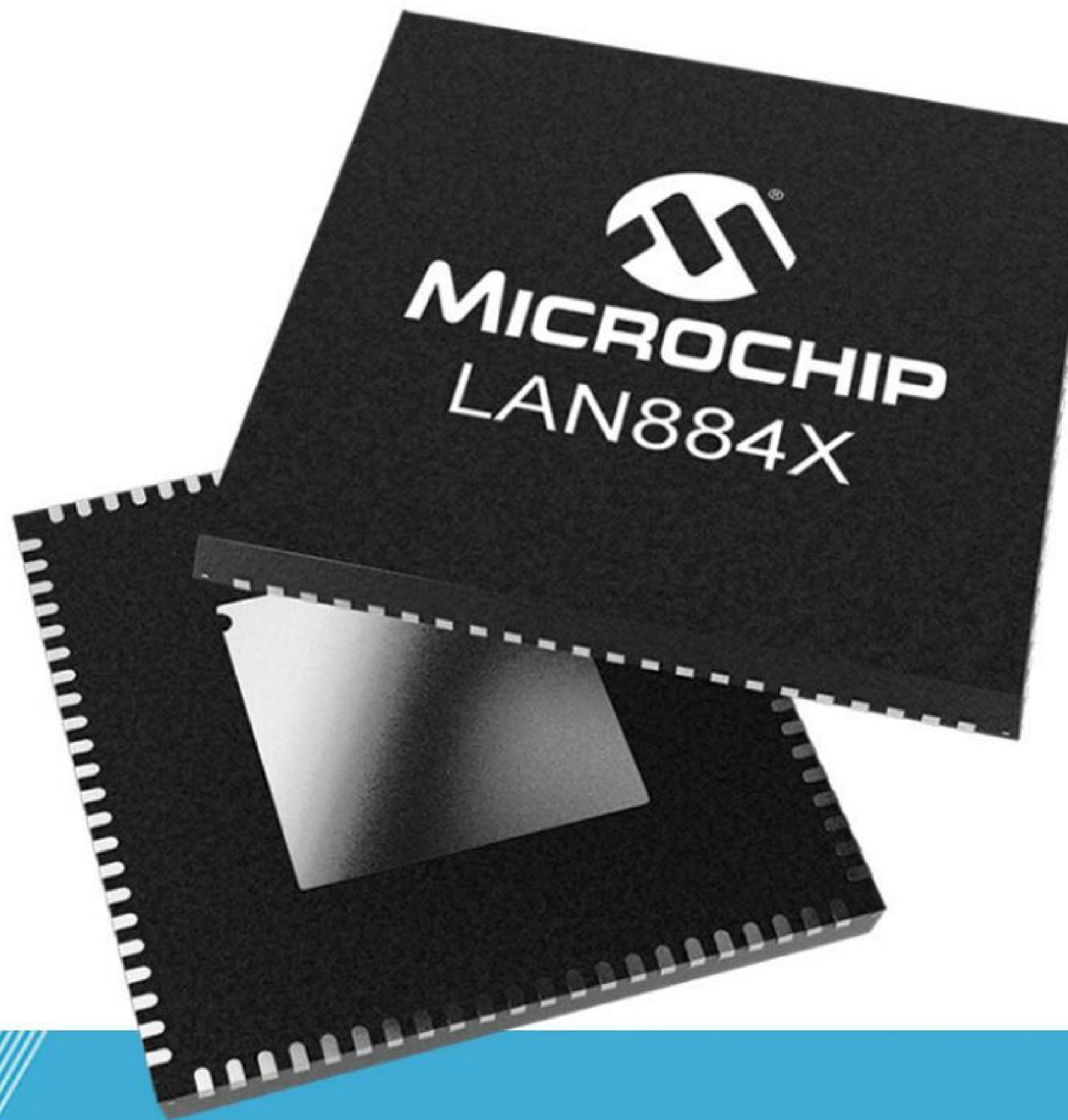

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FROM YOU

YOUR SUGGESTIONS AND THINGS YOU WANTED TO KNOW!

SOLAR APPLICATIONS

I am an avid reader of your articles in EFY magazines. There is always a lot to learn from them. I would like to read and learn about solar applications like solar light systems that can be used in residential areas.

Sachin Kudari

EFY. We have published quite a few articles on solar projects, such as:

1. Simple Solar Daylight Lamp Based On Solar Energy Harnessing For Apartments (October 2021 issue).
2. Solar Pooja Lamp That Runs Nonstop (July 2021).
3. Solar Day Lamp With Battery Backup (October 2020)
4. Portable Solar Lantern Cum Bedlight (August 2020)

You can also find these articles at *https://www.electronicsforu.com*

• • •

WATER FLOW METER

Hello sir, I am actually working on this idea (of water flow meter) as my graduation project, and I am quite stuck with the calculation side. I have purchased the MHT, water flow meter, and the pressure sensor, but I am not getting the calculations right.

We have installed these items on a water pipe that has a valve to control the flow of water. We have everything fixed, yet, when we measure with a digital multimeter, we get 1.3 microvolt but no current is detected.

We are using the Arduino board and have installed the program on desktop to obtain readings of the pressure and water flow, but without success. Can you please help?

Jude Safarjal

EFY. Please refer DIY article 'Digital Flow Meter For Water Pipes' published in August 2022 issue. You can also use the following link to see the article on EFY website: *https://www.electronicsforu.com/electronics-projects/digital-water-flow-meter*

• • •

SMART GLASSES

This is regarding the article titled 'Smart Glasses Like Google Glass Made With OLED Display' published in November 2022 issue. Can you please provide the detailed working video of the project giving details about the connections and how to run the project?

Divyanshu

EFY. You will find the working videos of the projects published in EFY magazine at *https://www.electronicsforu.com/category/videos-slideshows/videos*

• • •

OBJECT DETECTION BY ESP32 CAMERA

This is regarding 'Object Detection Using ESP32 Cam' published in December 2022 issue. Can I simulate this project in any simulator?

Ajay Gautam

EFY. Yes, you can check with simulators like proteus, wokwi, and the ohers.

• • •

IoT HEALTH STICKER

This is regarding 'A Small Portable IoT Health Sticker' article published in December 2022 issue. I want to change the cell charging system. For the IoT health sticker is there any reference design that I can implement and add a different battery charging system in that project?

Sinha

EFY. Yes, you can find reference designs of battery charging systems to implement it according to your need. You can check various reference designs at *https://www.electronicsforu.com/category/electronics-projects/industry-grade-projects*

• • •

ERRATA

The quantum ecosystem of the future. On page 27 in EFY November 2022 issue, under the heading 'Tapped ion based,' RMQA is abbreviated as programmable multicore quantum architecture while it should have been reconfigurable instead of programmable.

EFY. We thank Sachin for detecting this error and sharing with everyone!

❑ ***Getting to know IC 555.*** This is regarding my 'Getting To Know IC 555 Through Experiments, Part-1' DIY article published in December issue. In the circuit diagram for the second experiment shown there in Fig. 2, pin 6 and pin 7 of the IC that are tied together should be connected between cathode end of LED4 and positive end of C1. (Now it is shown connected between R7 and anode of LED4). The corrected circuit is shown in Fig. 1 above for the benefit of readers.

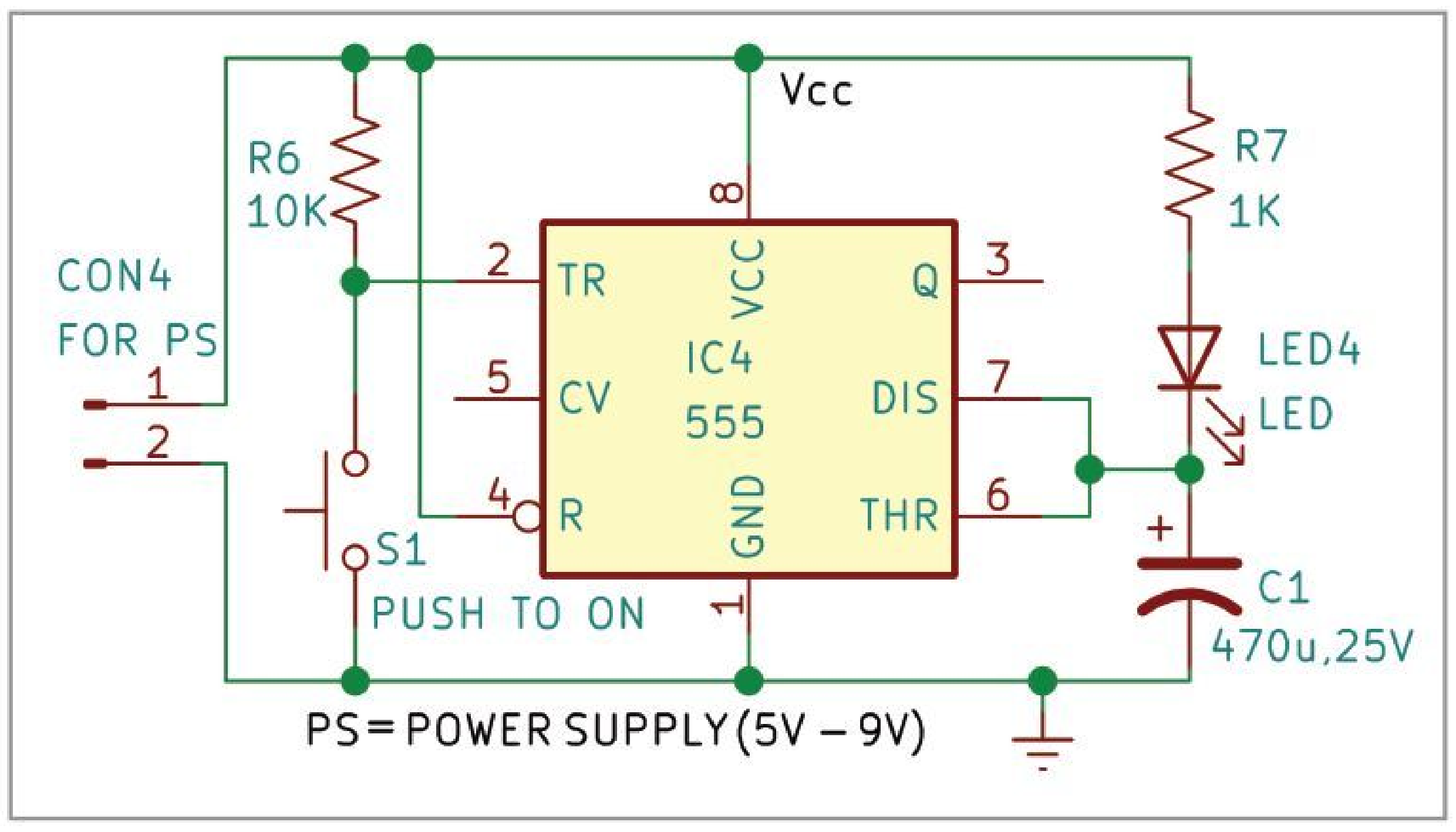


Fig. 1: Correct circuit for experiment 2

Rajeev Nilkanth Deshpande

Letters and questions for publication may be addressed to Editor, Electronics For You, D-87/1, Okhla Industrial Area, Phase 1, New Delhi 110020 (e-mail: **onedit@efy.in**)

RESEARCH
& INNOVATION UPDATES

Swarms of microbots controlled using vibrations

Researchers at Georgia Institute of Technology have developed a system to control swarms of 300 3mm micro-bristle robots known as microbots. They use vibrations to control the microbots' motility characteristics—the ability of an 'organism' to move independently. This concept is inspired from thermodynamics, when an agitated material can change phases from solid to gas to liquid. Researchers manipulated the level of vibration to influence the microbots to form clusters or disperse to create good spatial coverage. They have also developed computational models and a live tracking system for the 300-robot swarm using computer vision to better understand these phase separations. This enabled the researchers to analyse microrobots' behaviour and motion data that give rise to the swarm's characteristics.

Zhijian Hao (left) and Azadeh Ansari in their lab (Credit: https://techxplore.com)

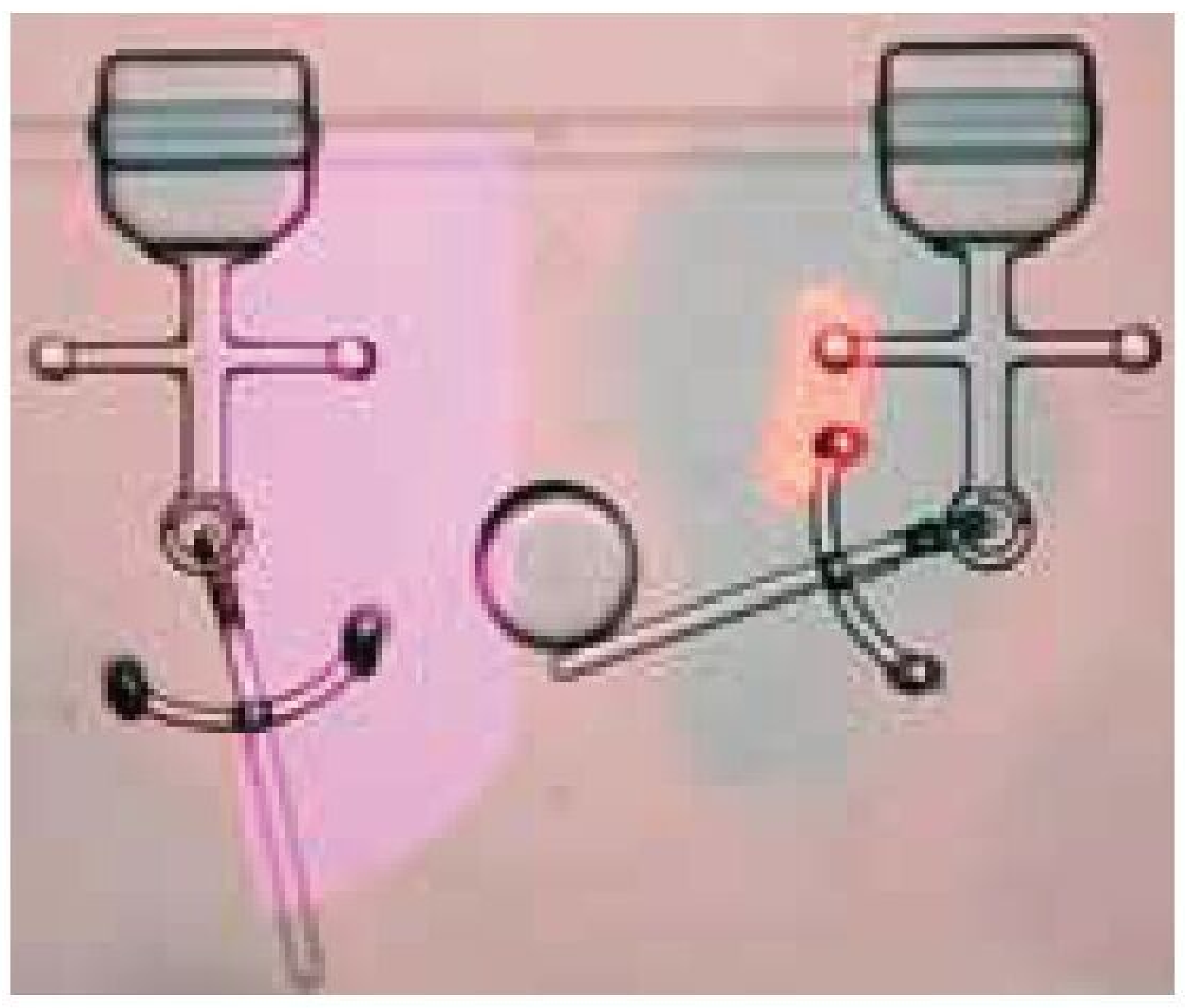
Mushroom skin replaces plastic as chip base

A team of researchers at Johannes Kepler University has developed a way to narrow down the use of plastic in electronic devices that causes environmental hazards. Researchers came across Ganoderma lucidum, a type of mushroom that grows a skin to cover its mycelium—its root-like part. They recorded that this skin was flexible and provided good insulation as well as it could withstand high temperatures. These properties of the mushroom skin can make it a very good chip substrate. The team developed a means for depositing metal electronic circuitry components onto the skin using physical vapour deposition, which was followed up with an ablated laser. Results showed that the skin worked nearly as well as the traditional plastic substrates and that it could withstand being bent repeatedly— they found no breakage after 2,000 bends.

Fungal-grown mycelium skins are introduced as bioderived, degadable and sustainable substrate materials for electronic sensor skins and batteries (Credit: https://techxplore.com)

3D printing enables autonomous functions for microbots

Designing movable actuators driven by chemical energy has been a difficult and time-consuming process. Researchers at the Department of Mechanical Engineering at Osaka University have developed a method for manufacturing complex microrobots driven by chemical energy using in-situ integration. By 3D printing and assembling the mechanical structures and actuators of microrobots inside a microfluidic chip the resulting microrobots were able to perform desired functions, like moving or grasping. This work may help realize the vision of microsurgery performed by autonomous robots. Soft microrobot structures are produced by shining laser light to harden a photo-inducible biocompatible hydrogel, poly (ethylene glycol) diacrylate.



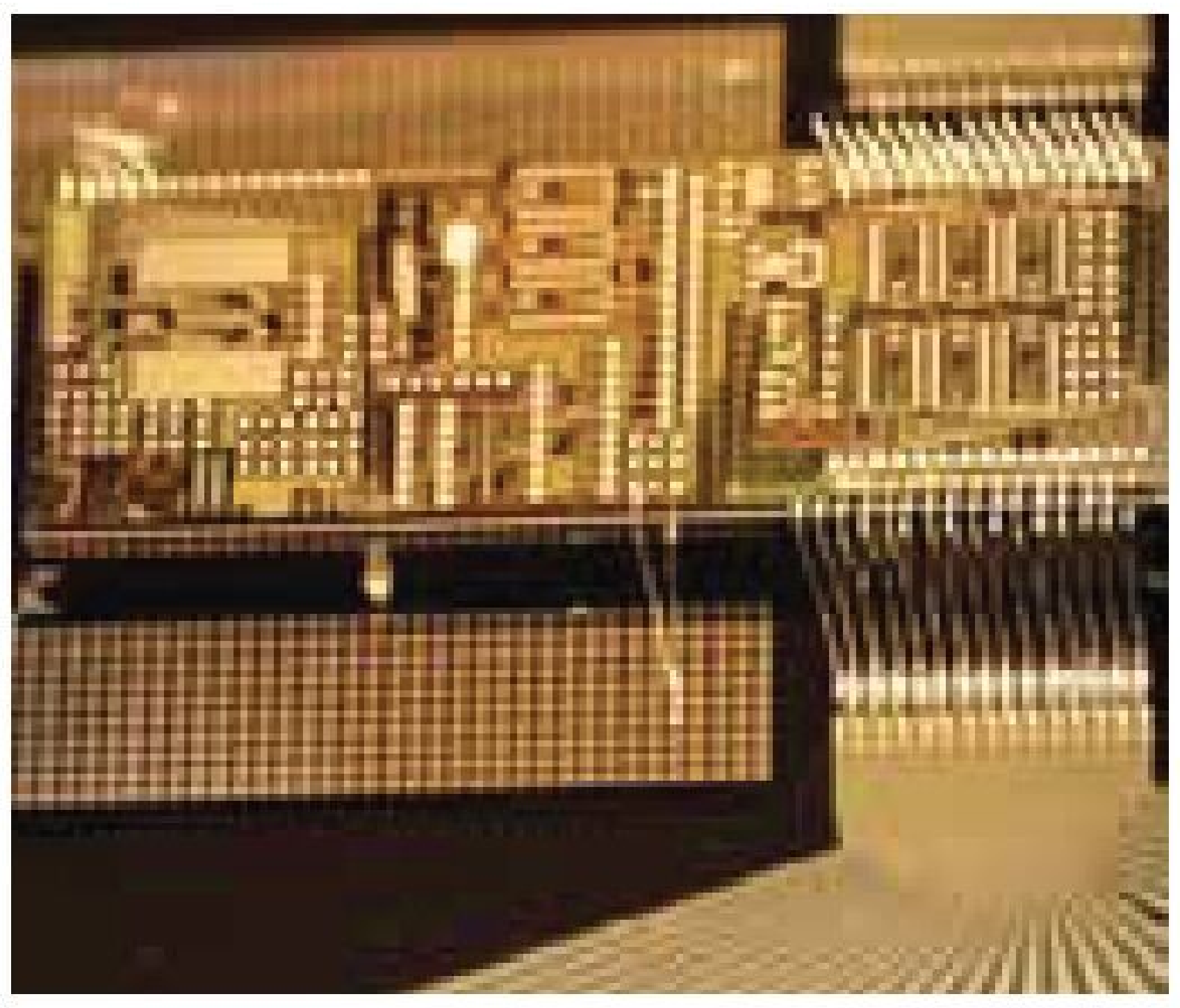
3D-printing microrobots (Credit: Keisuke Morishima, Science Robotics (2022). DOI: 10.1126/scirobotics.aba8212)

Neuromorphic skin to continuously monitor health

Wearable technology can be used as precision medical sensors designed to perform health monitoring and diagnosis. Health diagnosis requires continuous monitoring as the measurements could differ depending on the person's age, medical history, and other factors. Researchers have adapted the neuromorphic computing technology to create a device that could mimic the operation of the brain and train itself using past data sets. They designed a skin-like neuromorphic 'chip' consisting of a thin film of a plastic semiconductor combined with stretchable gold nanowire electrodes. Even when stretched to twice its normal size, the device functioned as planned without formation of any cracks. They developed an AI and trained it to distinguish healthy electrocardiogram (ECG) signals from four different signals indicating health problems. After training, the device was more than 95% effective at correctly identifying the ECG signals.

Optical chip trains artificial intelligence

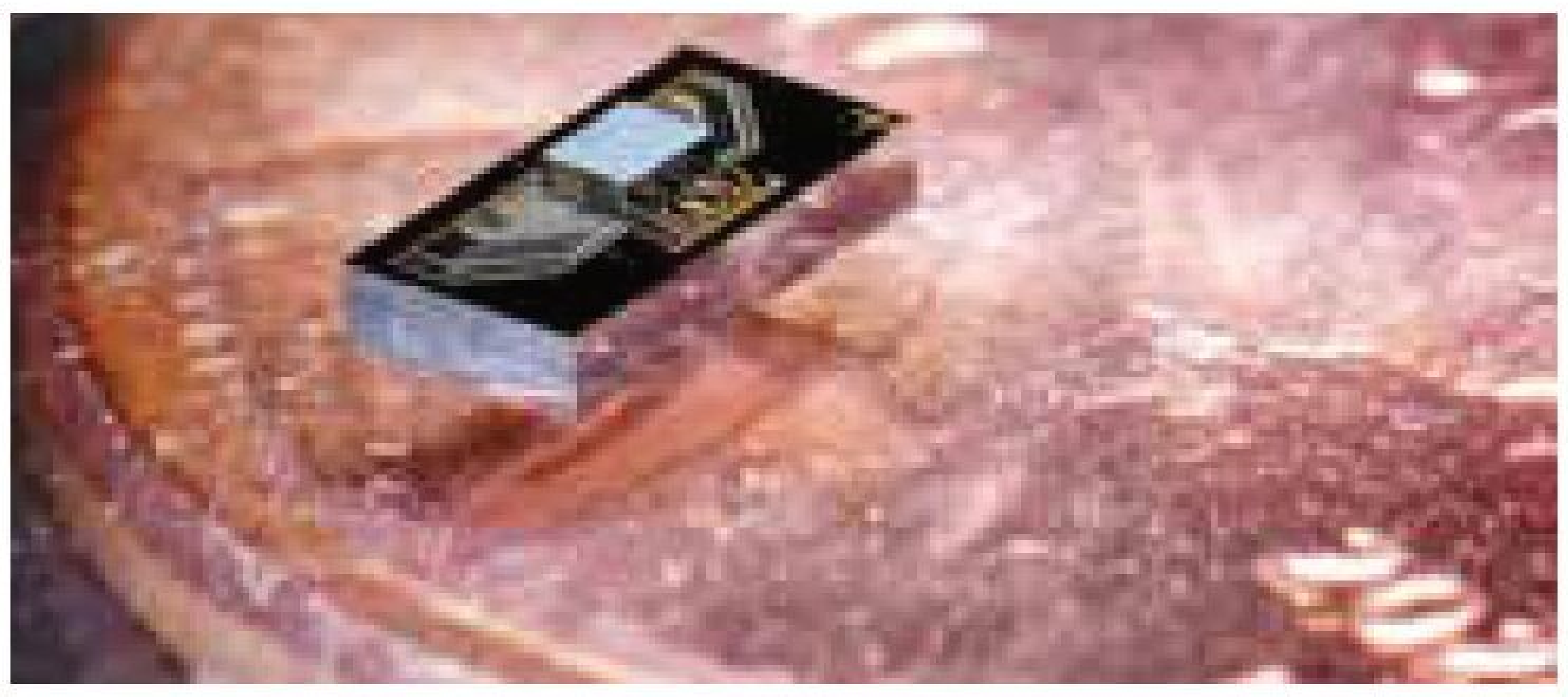
The training of artificial intelligence (AI) systems costs a significant amount of energy and carbon footprint. Even a completely developed AI demands high computational power. With the introduction of photonics-integrated chips there seems to be a way to deliver higher computing performance. Researchers from various institutions have come together and developed an optical chip that can train machine learning hardware. Machine learning is a two-step procedure. In the first step the data is used to train the system and then there is a performance test of the AI system. Based on the results and the errors observed, the hardware is reconfigured for the second training cycle. Thus far, photonic chips have only demonstrated an ability to classify and infer information from data. Now, researchers have made it possible to speed up the training step itself.



A picture of the chip used for this work (Credit: The George Washington University/Queens University)

A chip combo for ultrahigh speed data transmission

Researchers believe computation speed is becoming a "bottleneck, especially under stringent energy constraints." At Caltech and University of Southampton in England they have designed an electronic chip integrated with a photonic chip (uses light to transfer data), which can transmit data at ultrahigh speed. This device can be used for high-grade server rooms and data centres. As data processing is mostly done on electronics and the transmission does not necessarily require electronics, photonics (such as fibre-optic communication) can be used for data transmission. The resulting optimised interface between the two chips allows them to transmit 100 gigabits of data per second while producing just 2.4 pico-Joules per transmitted bit.



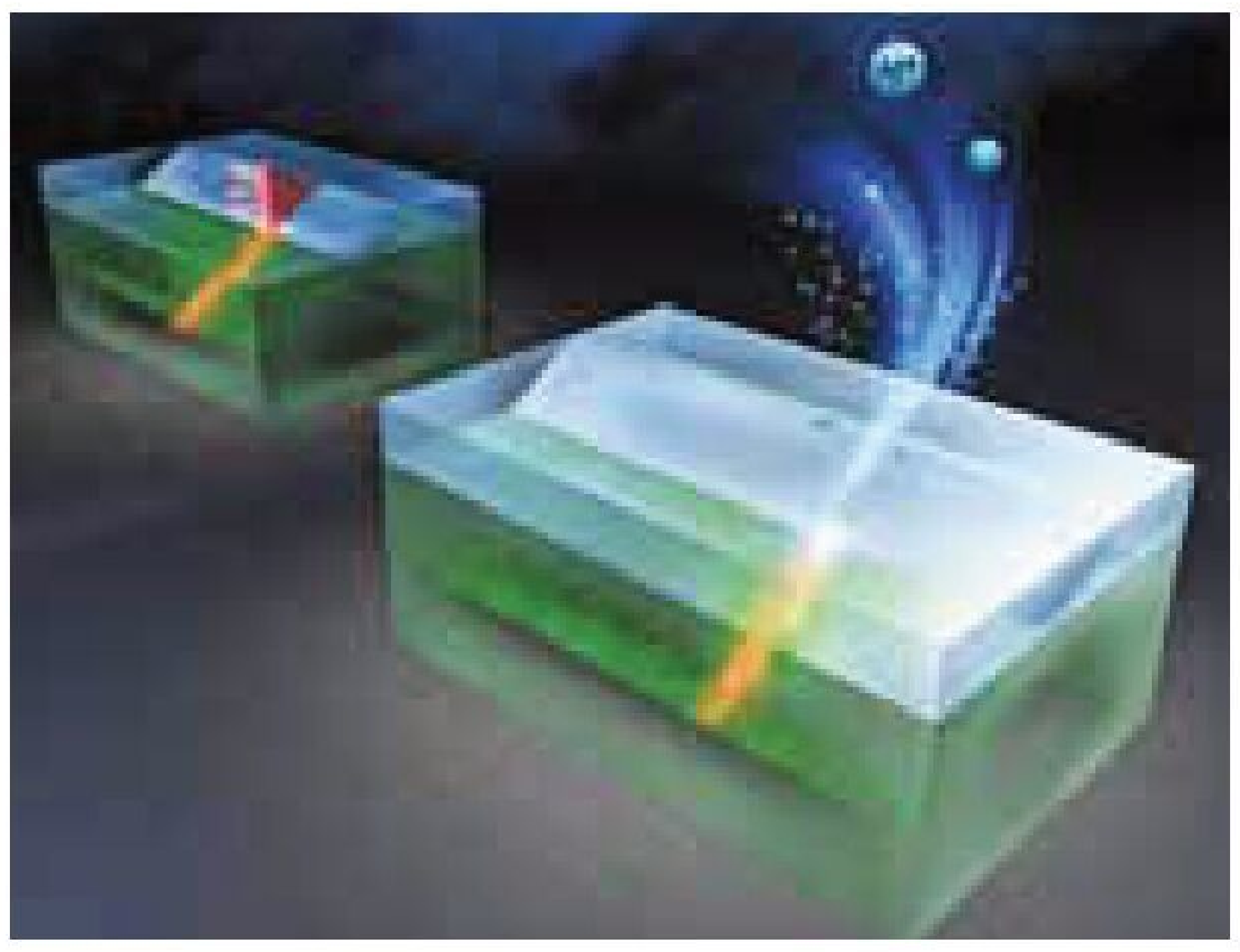
The chip sandwich: an electronics chip (the smaller chip on the top) integrated with a photonics chip, sitting atop a penny for scale (Credit: Arian Hashemi Talkhooncheh)

Brain-machine interface improves significantly

Researchers at the University of Texas have developed a system that takes direct inputs from the human brain through brain machine interface (BMI) and uses it as commands to drive the wheelchair. Researchers recruited three tetraplegic people and trained them for 2-5 months. Users wore a skullcap that detected their brain activities through electroencephalography (EEG), which were converted to mechanical commands for the wheelchairs via a brain-machine interface device. The participants were asked to control the direction of the wheelchair by thinking about moving their body parts. They observed that this could be done not only through machine learning of the device but also learning in the brain of the participants. Over the course of training, the brain-machine interface device team saw significant improvement in accuracy of over 95%.

Proton implantation prevents single Shockley stacking

Silicon carbide (SiC) is a promising alternative to silicon for power electronics devices, but it has low reliability as it eventually degrades. Over a period of time, small dislocations take place in the crystal structure, which eventually turn into large defects. These defects are called single Shockley stacking faults. Researchers from the Nagoya Institute of Technology have developed a solution called proton implantation which prevents degradation. Proton implantation involves injecting hydrogen ions into the substrate using a particle accelerator. The idea is to prevent the formation of single Shockley stacking faults by pinning down partial dislocations in the crystal, one of the effects of introducing proton impurities. However, proton implantation itself can damage the 4H-SiC substrate, due to which high-temperature annealing is used as an additional processing step to repair this damage. Results showed that the diodes that had undergone proton implantation performed as well as regular ones but without signs of bipolar degradation.



Silicon carbide (SiC) is a promising alternative to silicon for power electronic devices, but has low reliability for undergoing bipolar degradation. Now, researchers from Japan have proposed a method that can suppress bipolar degradation in SiC via proton implantation into the substrate using a particle accelerator (Credit: Masashi Kato from Nagoya Institute of Technology)

Nerve-operated prosthetics show the way for better control

Researchers at University of New South Wales, before the pandemic, had theoretically proved that sensors developed using liquid crystal and integrated optics technology—dubbed 'optrodes'—can detect nerve impulses in a living animal body. These optrodes use light instead of electricity to measure neural activity. Recently they demonstrated that optrodes could be used to accurately measure neural impulses as they moved along a nerve fibre in a living animal. They connected an optrode to the sciatic nerve of an anesthetised animal. The nerve was then stimulated with a small current and the neural signals were recorded with the optrode. They demonstrated that nerve impulses—which are relatively weak and measured in microvolts—can be registered by optrode technology. In future, a chip with thousands of optical connections could connect to your brain, or someplace in the arm before the nerve bundle separates to connect to a prosthetic hand, and the hand could function much the same way as a biological one.

Optrodes have the potential to make future prosthetics as functional as the limb they replace (Credit: https://scitechdaily.com)

Better resolution of 3D printing now made possible

The problem with current 3D printing technology is that it does not have enough resolution for the print. Researchers from Stanford University have developed a solution to this problem. Instead of writing metals directly, they 3D print a hydrogel and use it as a scaffold for metal-containing liquid precursors. Hydrogels are made from flexible polymer chains which do not dissolve in water. When these hydrogels are exposed to light from low-powered ultraviolet lamps, the polymer chains cross-link resulting in hardening of the hydrogel. Researchers then infused the 3D printed hydrogel scaffolds with metal salts dissolved in water, causing the metal ions to infiltrate the hydrogel—not just coat its surface. Then, in reaction portion of the process, the researchers burn away the hydrogel portion of the structure in a furnace that reaches 700 to 1100 degrees Celsius, depending on the material.

Better technique found for large optical neural networks

Researchers from MIT have developed a way to effectively scale an optical neural network for analogue devices. By adding a tiny hardware component to the optical switches that form the network's architecture they can reduce even the uncorrectable errors that would otherwise accumulate in the device. Researchers have developed a new type of MZI, which consists of an additional beam splitter to the end of the device, naming it '3-MZI' because it has three beam splitters instead of two. Due to the way this additional beam splitter mixes the light, it becomes much easier for an MZI to reach the setting it needs to send all light through its bottom port. The team found that it can eliminate much of the uncorrectable error that hampers accuracy. And as the optical neural network becomes larger, the amount of error in the device actually drops—the opposite of what happens in a device with standard MZIs.

Next-gen responsive material learns from its past

Researchers at Aalto University have developed a new material that changes its electrical behaviour based on previous experience, effectively giving it a basic form of adaptive memory. Responsive materials have become common in a range of applications, from glasses that darken in sunlight to drug delivery systems. However, existing materials always react in the same way each time. Researchers synthesized micrometer-sized magnetic beads which were then stimulated by a magnetic field. When the magnet was on, the beads stacked up to form pillars. The strength of the magnetic field affects the shape of the pillars, which in turn affects how well they conduct electricity. The system's memory allows it to behave in a way that resembles rudimentary learning. When they exposed the beads to a quickly pulsing magnetic field, the material became better at conducting electricity, whereas slower pulsing made it conduct poorly.

Paper-thin solar cells turn any surface into a power source

Researchers at MIT have designed an ultralight fabric solar cell that can quickly and easily turn any surface into a power source. The cells are one-hundredth the weight of conventional solar panels but generate 18 times more power per kilogram. As they are thin and lightweight, they can be laminated onto many different surfaces. Researchers used nanomaterials in the form of printable electronic inks to produce these solar cells. Then they were coated using a slot-die coater, which deposits layers of electronic materials onto a releasable substrate that is only 3-micron thick. Using screen printing, an electrode was deposited on the structure to complete the solar module. The 15-micron thick printed module can be peeled off the plastic substrate, forming an ultralight solar device. When the device was tested, it could generate 730 watts of power per kilogram while freestanding and about 370 watts per kilogram if deployed on the high-strength Dyneema fabric.

MIT researchers have developed a scalable fabrication technique to produce ultrathin, lightweight solar cells that can be stuck onto any surface (Credit: Melanie Gonick, MIT)

Building materials atom by atom being made possible

Researchers have used deep reinforcement learning to steer atoms into a lattice shape with a view to building new materials or nanodevices. Such precise movement of atoms required to design very small devices based on single atoms is important for nanodevices like transistors or memories. "Give it a goal and it will do it. It can solve problems that humans don't know how to solve." Building new materials atom-by-atom, rather than through traditional chemical techniques, may also reveal interesting properties related to superconductivity or quantum states.

Telepathic device enables tactile sensation from distance

Researchers have developed a telepathic device that can be attached to the fingertip like a sticker and leverages the unique vibration pattern of touch and texture. By having this close contact with the skin, it is able to provide a more vivid tactile experience and bridge the immersion hindrance of other similar devices. Researchers used a piezoelectric element and an ultra-thin flexible substrate, which was able to precisely integrate microscopic sensors and actuators of less than 1mm on the substrate. The high-resolution composite sensor, which is finely structured at 1.8mm intervals, can feel tactile patterns in a wide frequency range of 1 ~ 1,000Hz. The device when tested was able to simultaneously measure both slow-changing pressure (static pressure) and fast-changing pressure (dynamic pressure).

Soft robot heals like human skin

Researchers at Cornell University have designed a soft robot capable of healing itself using light for dynamic sensing. They have developed stretchable fibre-optic sensors for creating soft robots and its components—from skin to wearables. The first step for self-healing to work is that the robot must be able to identify something that needs to be fixed. Researchers pioneered a technique using fibre-optic sensors coupled with LED lights capable of detecting minute changes on the surface of the robot. When combined with a polyurethane urea elastomer, these sensors showcase rapid healing and strength. The resulting SHeaLDS (self-healing light guides for dynamic sensing) provides a damage-resistant soft robot that can self-heal from cuts at room temperature without any external intervention. Researchers developed and punctured one of its legs six times, after which the robot was every time able to detect the damage and self-heal each cut in about a minute.

Researchers installed SHeaLDS in a soft robot resembling a four-legged starfish and equipped with feedback control. After the researchers punctured one of its legs, the robot was able to detect the damage and self-heal the cuts (Credit: Cornell University)

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TRULY INNOVATIVE ELECTRONICS

INNOVATION UPDATES

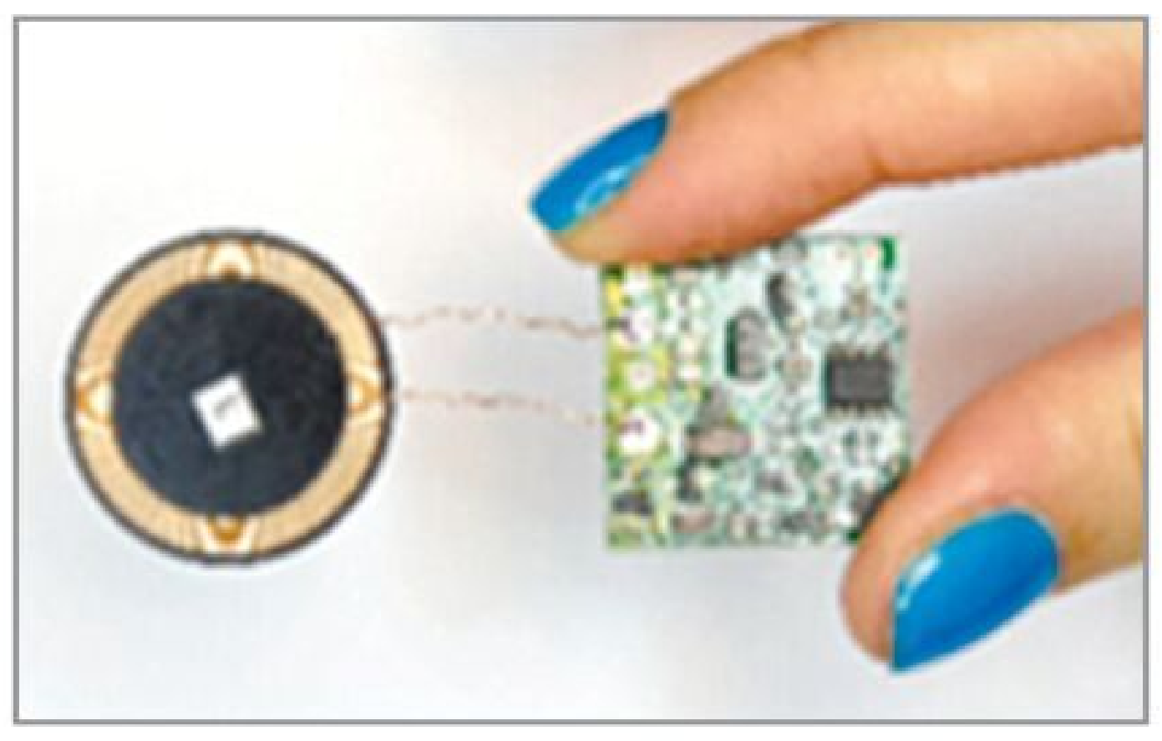
Amongst numerous press releases of new products received by us, these are the ones we found worthy of the title *Truly Innovative Electronics*

Antenna designed to enhance coverage in all directions

The BodyWave antenna is an on-ground SMD antenna optimised for wearable applications. The BodyWave increases radiation efficiency, detuning immunity and propagation in all directions. BodyWave antennas are designed to increase coverage in directions obscured by the human body, with 10 to 20dB increased link budget in those directions when compared to existing commercially available chip and printed antennas. It features a 50-ohm SMD antenna component. This device can allow designers to create wearable devices that work without connectivity issues even in crowded rooms. The BodyWave antenna can produce BodyWaves that help facilitate wireless communications when there is no direct line of sight with both on-body and off-body receivers. It is designed for use in the 2.45GHz ISM frequency band, suitable for Bluetooth, Wi-Fi, and ANT + applications.

Antennaware
https://antennaware.co.uk

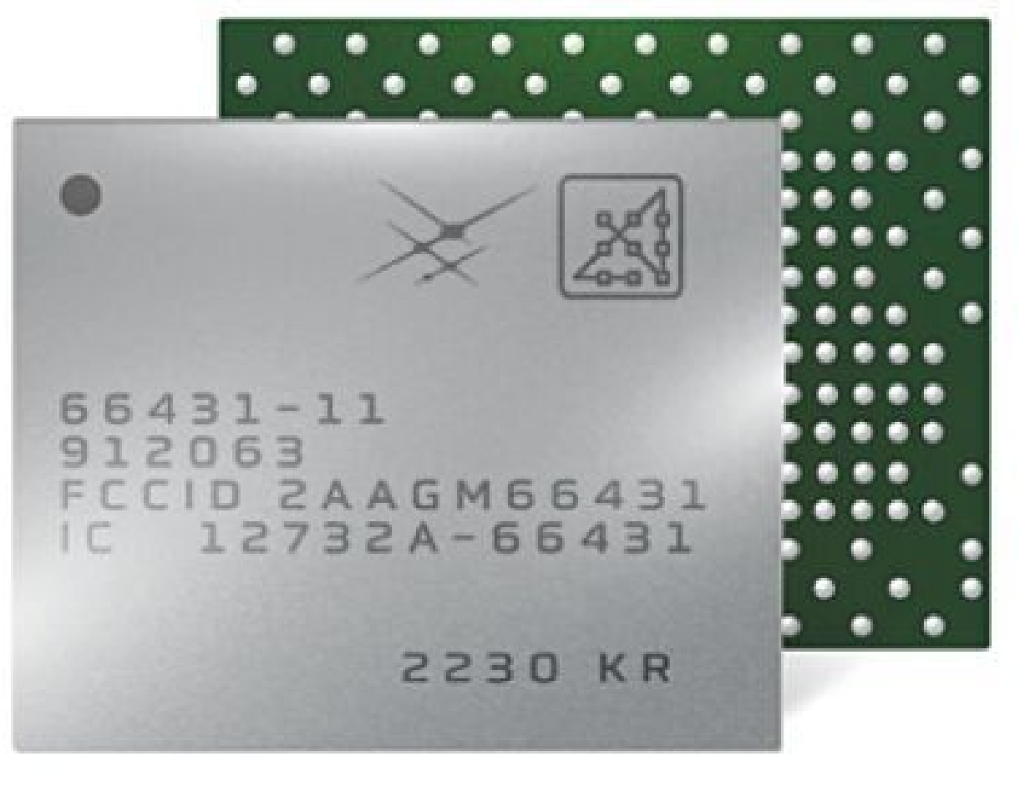
Innovative wireless power solution for small IoT devices



Powermat PMT 100 is a wireless charging solution that allows small IoT devices to be charged more securely at a faster speed. This hybrid solution utilises both inductive wireless charging and resonance, thus producing more power, more freedom of positioning, longer ranges between wireless power transmitters and receivers, and lower implementation costs. The module does not require any external receiver, microcontroller, and needs minimal peripheral components, thus reducing design complexity and cost while also reducing the size of the product. Powermat PMT 100 enables higher performance levels and a seamless charging user experience at a price point that supports scale. It is suitable for use in various applications, including small medical, lifestyle, and smart home Internet of Things (IoT) devices.

Powermat
https://powermat.com

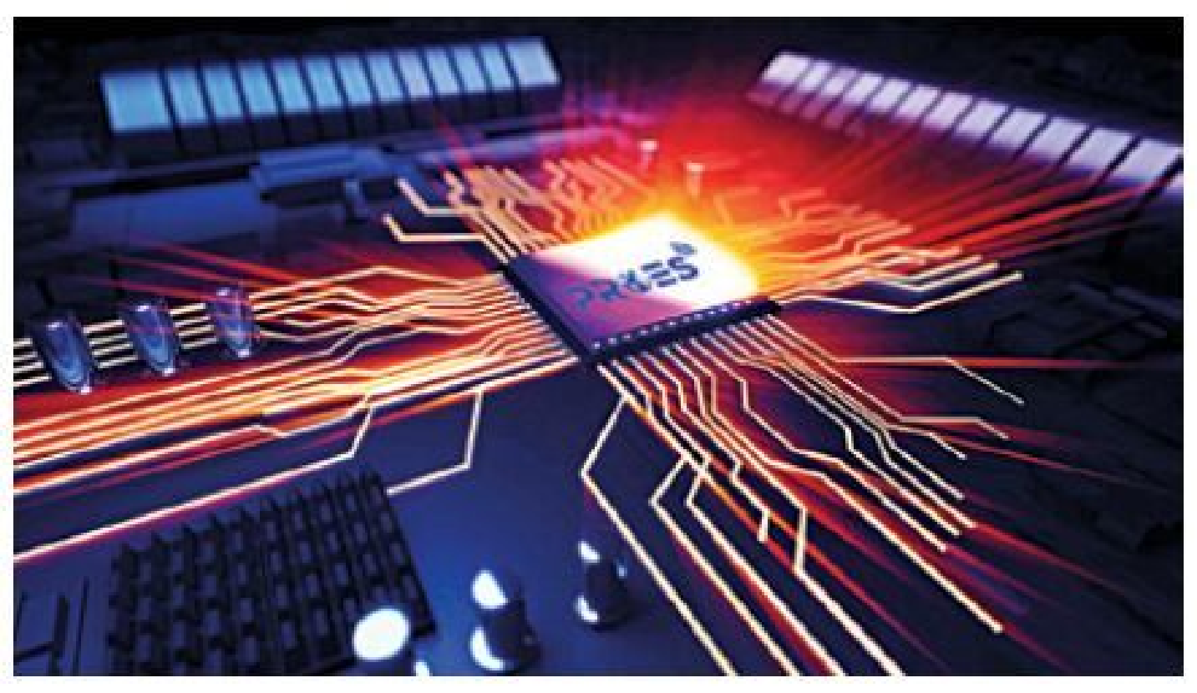
World's smallest LTE-M/NB-IoT connectivity platform



Skyworks and Sequans have jointly developed SKY66431, the world's smallest LTE-M/NB-IoT connectivity platform for IoT communication systems. The SKY66431 is a highly integrated multi-band, multi-chip SiP supporting 5G massive IoT platforms, offering high-performance connectivity with ultra-low power consumption. The SiP can reduce the design complexity while providing high-performance end products, reducing the cost of development and accelerating time-to-market. The IoT platform is suitable for use in utility meters, asset trackers, security and alert systems, and other battery-powered devices, such as wearable medical and fleet management.

Skyworks: https://www.skyworksinc.com
Sequans: https://www.sequans.com

RF booster co-processor for software or hardware implementation



PROES RF booster co-processor (RBcP) can improve reliability, communication distance, and power consumption in any RF communication system. The RBcP enables designers to modify the communication range without needing to change the bandwidth or the transmission power, therefore changing the communication range without changing any hardware or design. The longer transmission range lowers the number of repeaters, thus reducing the time and costs of deployment. PROES RBcP is available on software to be integrated in a software designed radios. For hardware implementation, the same functionality is also provided on FPGA.

PROES
https://rfproes.com

PMIC optimised for OLED IT devices

Magnachip's power management IC (PMIC) is designed for IT devices equipped with OLED screens. The PMIC communicates with a system by using I2C protocol. Magnachip's PMIC can control functions such as output voltage control, on/off block,

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output voltage sequence management, protection circuit fault flag, and switching frequency transition. The fast transient response of this PMIC supports a variable refresh rate. This feature greatly reduces power consumption and enables a smooth and comfortable viewing experience for games and high-quality videos at refresh rates of 60 ~ 240Hz.

Magnachip
https://www.magnachip.com

Industry's first miniature wireless AI vision and audio module

Wi-Fi
Bluetooth
Synaptics

Katana Connect is the industry's first ultra-miniature system on module (SoM) to deliver low-power, AI-enabled computer vision and audio sensing capability with integrated Wi-Fi/Bluetooth connectivity. The SoM is a ready-to-use solution that enables rapid implementation of AI sensing features for connected IoT devices targeting a range of applications, including home automation, security, ambient assisted living, industrial safety, and monitoring. The SoM can also serve as a platform for the development of innovative sensing methods, such as wireless sensing, that complement and enhance Katana's vision and audio edge AI features.

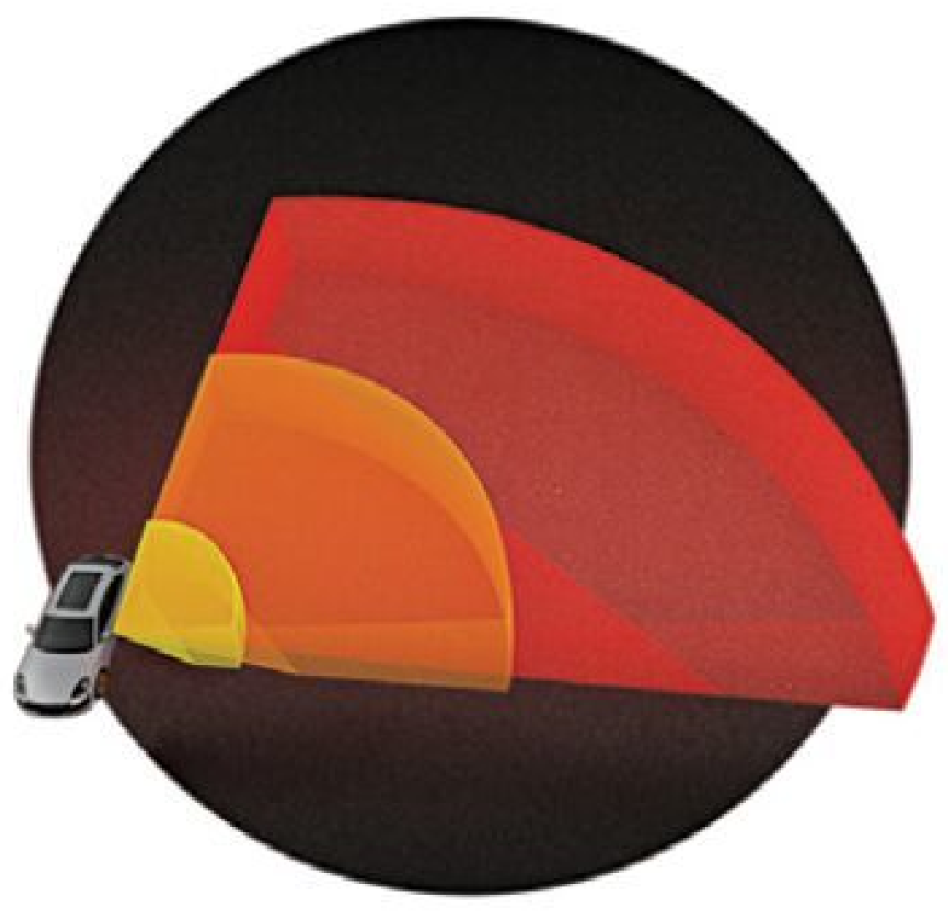
Synaptics Incorporated
https://www.synaptics.com

Deterministic processor for ultra-low latency

GroqChip processor accelerates AI, ML, and HPC workloads and removes extraneous circuitry from the chip. The processor reduces data movement for predictable low-latency performance. This standalone chip provides flexible integration into compute-intensive applications. The chip features up to 80TB on-die memory bandwidth that facilitates massive concurrency and data parallelism needed for bandwidth sensitive applications. The chip has integrated software control units at strategic points to optimise data movement and processing. It offers up to 750TOP, 188TFLOP (INT8, FP16 @900MHz). It also offers end-to-end on-chip protection that improves uptime and reliability with error correction code protection throughout the entire GroqChip data path.

Groq
https://groq.com/products

Industry's first software-definable flash lidar



T30P from Preact Technologies is a software-definable flash lidar. It is one of the fastest flash lidars on the market, which makes it suitable for ground and air robotics or industrial applications. It is based on the continuous wave time-of-flight technique, which enables it to work in all weather conditions and detect objects even in the darkest of the night or the most intense direct sunlight. The sensor, when combined with image processing and machine learning, can detect and track multiple objects simultaneously. The sensor has a wide field of view of 120° × 80° and a high operating frequency of 150Hz, which makes it suitable for use in the pre-crash system to deploy airbag even before impact at speeds of over 150kmph.

PreAct Technologies
https://www.preact-tech.com

Processor that can provide native dataflow processing

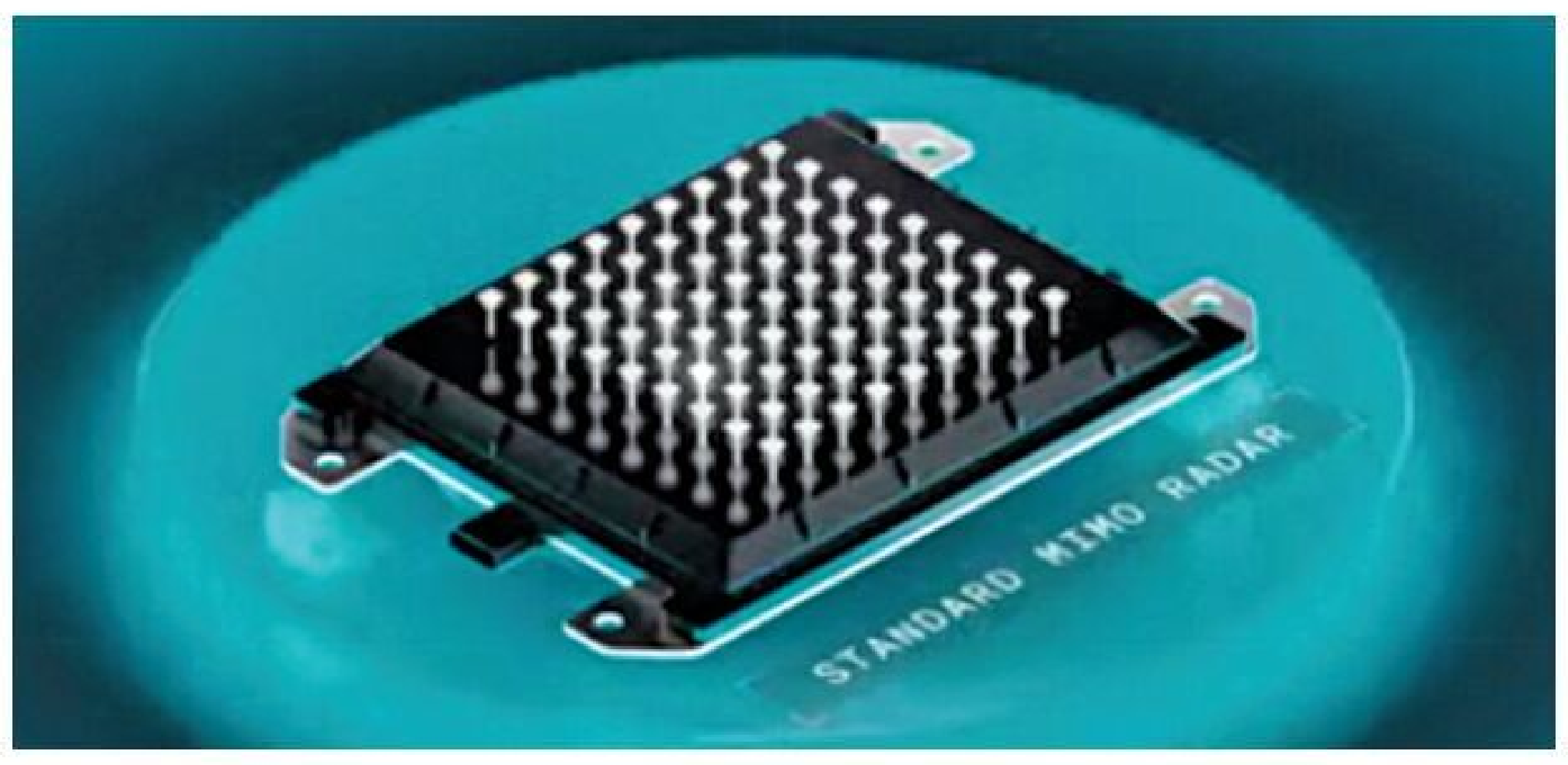
SambaNova DataScale is built with a reconfigurable dataflow unit, the industry's next-generation processor that can provide native dataflow processing. SambaNova offers a new AI system that triples previous system speed. It is a fully integrated hardware-software system that enables organisations to train and deploy demanding deep learning, foundation model, and AI for Science workloads. SambaNova DataScale features SambaFlow, a complete software stack designed to take input from standard machine learning frameworks. It delivers fast performance with even the largest and most challenging models, such as GPT. DataScale reduces the cost and complexity of AI initiatives by providing a fully integrated system, from silicon to software, that is designed to deliver a unique combination of high performance, unprecedented ease of use, and seamless scalability.

SambaNova
Cardinal SN30
SambaFlow Software
DataScale

SambaNova Systems
https://sambanova.ai

4D imaging radar architecture for autonomous mobility systems

Ambarella's centrally processed 4D imaging radar architecture can enhance safety and driveability of autonomous vehicles. It is the world's first centralised 4D imaging radar architecture, which allows both central processing of raw radar data and deep, low-level fusion with other sensor inputs, including cameras, lidar, and ultrasonics. This architecture will enable higher performance imaging radar systems and new ADAS/AD features while simultaneously optimising the cost of radar sensing. The 4D imaging radar architecture is suitable for use in level 2+ to level 5 autonomous vehicles, as well as autonomous mobile robots (AMRs) and automated guided vehicle (AGV) robots.



Ambarella
https://www.ambarella.com

WHAT IF
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Intelligent valve controller

Valmet Neles NDX 2.0 is an intelligent valve controller for valve automation in industries and plants. The next-generation valve controller features renewed interface, making it simpler to use with all types of valves available in the market. The pneumatic relay in the controller consumes up to 90% lower air compared to other conventional controllers, thus reducing energy consumption. The NDX 2.0 provides interoperability with the most common automation systems and is suitable for most operating environments.

Valmet

https://www.valmet.com

Radiation-tolerant PWM controller

The TPS7H5005-SEP is a radiation-tolerant, current mode, dual output PWM controller optimised for silicon and gallium nitride (GaN) based DC-DC converters in space applications. The switching frequency of the TPS7H5005-SEP can be configured from 100kHz to 2MHz while still maintaining a very low current consumption, which makes it ideal for fully exploiting the area reduction and high efficiency benefits of GaN based DC-DC converters. The device features integrated synchronous rectifier control outputs and dead-time programmability in order to target high efficiency and high performance topologies. The PWM controller is suitable for use in space satellite point of load supply for FPGAs, microcontrollers, data converters, and ASICs.

Texas Instruments

https://www.ti.com

Ultra-compact tactile switch

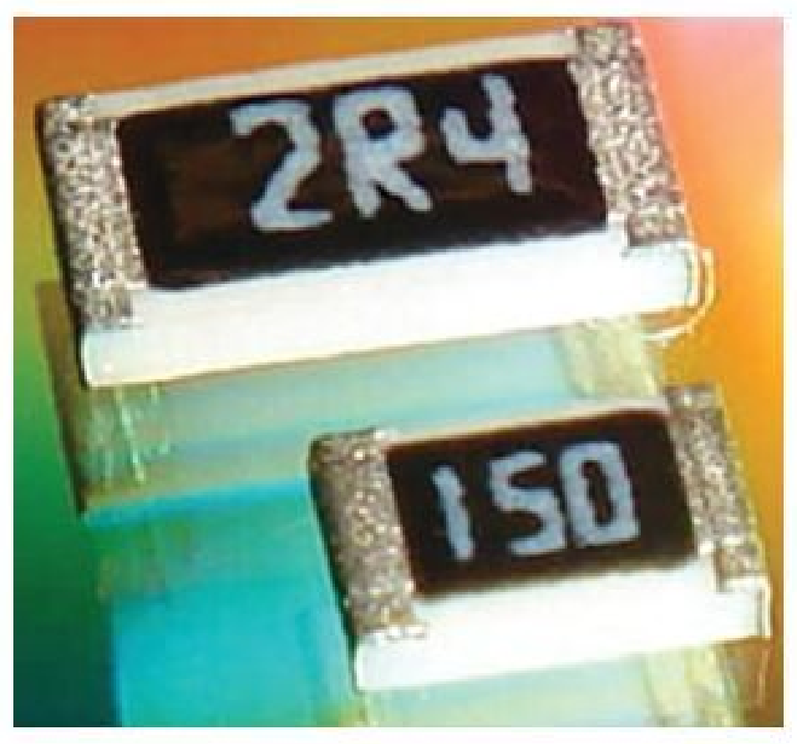
The TS19 series from CUI Devices is the industry's smallest tactile switch housed in a compact 3mm × 2mm × 0.6mm package. The series features an IP67 rating which makes it suitable for use in locations with high humidity and environmental contaminants. Moreover, the tactile switches are highly reliable and come with a lifecycle rating of up to 300,000 cycles. These tactile switch models feature surface mount packages, gull-wing terminations, SPST circuit types, and operating force ratings of up to 240 ± 50gf. The TS19 series are reflow solder compatible and suitable for 12V operation and can work at a temperature range from -30 to 85°C.

CUI Devices

www.cuidevices.com

Pulse withstanding chip resistor

RCPA is a series of automotive-grade pulse-withstanding chip resistors from Stackpole. The RPCA has limited to no calibration trim, providing reliable and repeatable pulse handling behaviour. These resistors are highly reliable and are AEC-Q200 qualified, which makes them suitable for use in harsh automotive conditions. The resistors are suitable for use in applications which require high durability and long-term reliability, such as motor controls, thermostats, and oven controls, etc.



Stackpole

https://www.stackpole.com

6-axis IMU

LSM6DSV16X from STMicroelectronics is a 6-axis inertial measurement unit (IMU) that can precisely detect movement in a 3D space. It combines artificial intelligence, adaptive-self-configuration, and ST's sensor fusion low power technology for high power optimisation. The IMU is capable of providing a fast, real-time response as all the processing is done in the MEMS sensor itself. The LSM6DSV16X also features a triple sensing core to meet the differing needs of user-interface controls and optical/electronic image stabilisation. The LSM6DSV16X is ideal for applications such as advanced 3D phone mapping, precise gesture recognition for XR headsets, always-on activity tracking, etc.

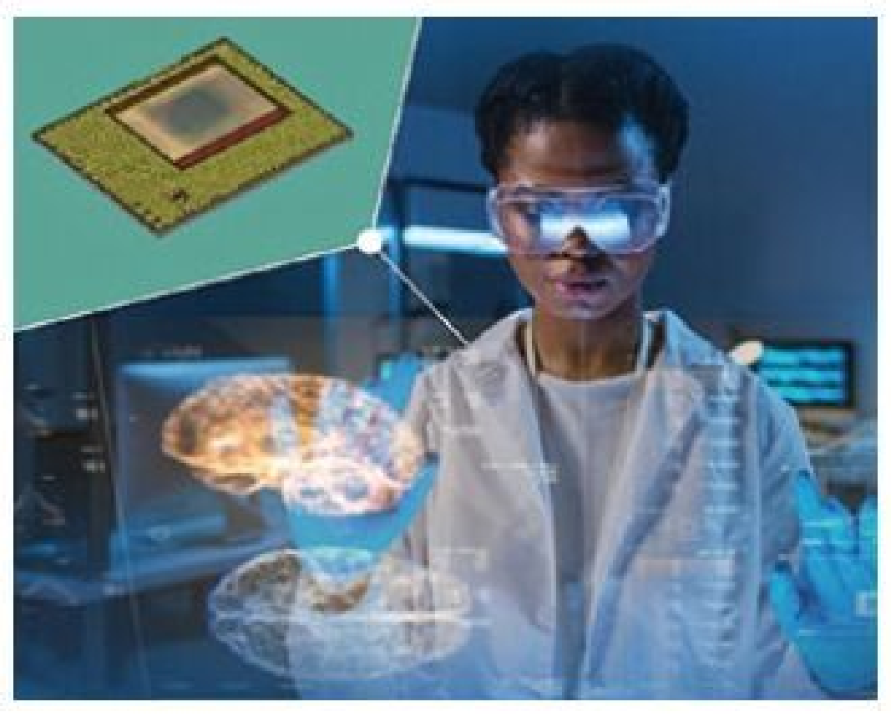
LSM6DSV16X

STMicroelectronics

https://www.st.com

Long range iTOF imager

Infineon's novel pixel technology boosts 3D camera performance while lowering power consumption. The IRS2975C is the industry's first sensor to utilise Infineon's pixel technology and works on the principle of indirect ToF (i-ToF) to detect depth. The sensor comes in a small size and is suitable for various iToF applications. It is capable of delivering a very high possible operating range



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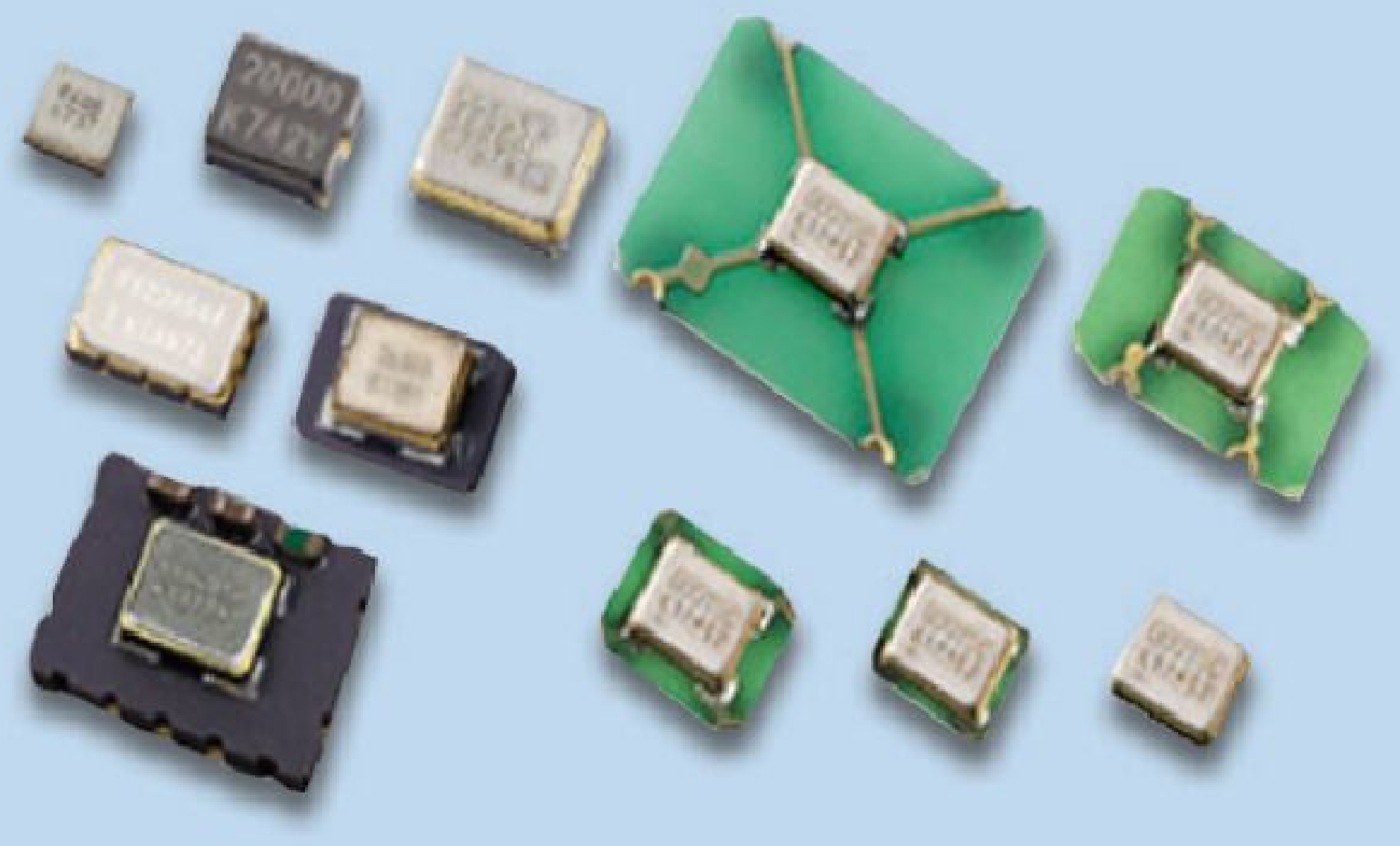
Electronic Components Segment Product Range

KYOCERA AVX



Crystal Devices

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https://india.kyocera.com
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at an optimal power budget. The IRS2975C image sensor is suitable for use in various applications, including smartphones, service robots, drones along with various IoT devices.

Infineon

https://www.infineon.com

Power terminal blocks

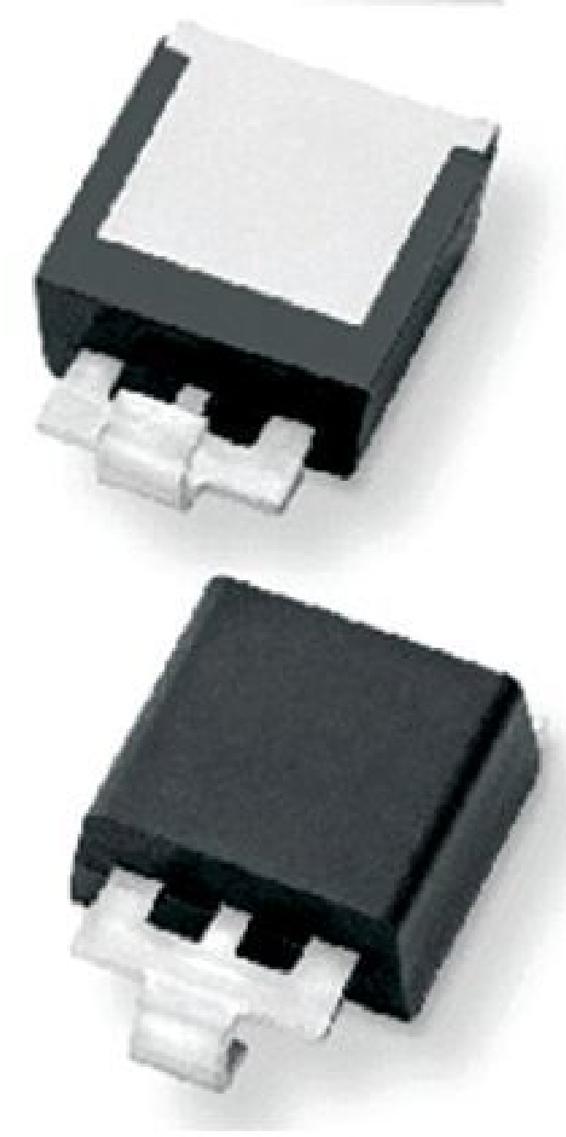
The EB4210 from Omni Pro Electronics is a series of high-power terminal blocks with a heavy-duty spring clamp. The EB4210 series is available in voltages of 300V and 600V, from 55 to 65A and with 6 to 16AWG. The stainless-steel spring clamp system has a patented ergonomic lever design for finger-friendly, tool-free wiring, and the lever actuated clamps enable reduced wiring. The design of the power terminal block is optimised for easy wire entry. The finger friendly power terminal block can be used in multiple applications, including motor controls, industrial switching equipment, solar power, and even marine industry.

Omni Pro Electronics

https://www.omnipro.net

High surge rating diodes

SMTOAK2 TVS diode series from Littlefuse can protect devices against lightning strikes and transient surges. It is ideal for high-power-density applications that require robust protection in a small footprint. This TVS diode series enables designers to achieve robust circuit protection with less PCB space via a modified, compact SMTO-263 surface-mount package that is 50% smaller than SMTO-218 surface-mounted solutions. The SMTOAK2 can be used in critical applications such as data centre, telecom, power supply, etc, where protection against inductive kicks and lightning strikes is crucial.



Little Fuse

https://www.littelfuse.com

USB decoder IC

The AP43776Q USB decoder IC from Diodes is a highly integrated, dual-channel, USB Type-C, PD3.1/PPS, BC 1.2 and QC protocol decoder. It supports USB power delivery 3.1 standard power range and programmable power supply. It supports legacy battery charging (BC) 1.2 as well as Quick Charge QC5 fast charging protocols and is highly optimised for multi-port automotive USB device charging systems. The AP43776Q features a built-in microcontroller unit with 12kB one-time programmable (OTP) ROM, plus a multi-time programmable ROM resource tool. It features an I2C interface that enables inter-chip communication with DC-DC controllers and converters in the charging system. This simplifies the control loop and lowers overall component costs.

USB TYPE-C
DIODES
AP43776Q

Diodes

https://www.diodes.com

Fuses for EVs

Bel Power Solutions' EV fuses are high-voltage (HV) fuses designed for electric vehicle (EV) and energy storage applications. The fuses are used for both overloads and short circuit protection and cover 240V, 500V, and 1,000V applications. The HV fuse can enhance the safety of an EV or HEV. These fuses can be used in various applications, including battery modules, battery packs, battery junction boxes, chargers, charging stations, auxiliary circuits, etc.

Bel Power Solutions

https://www.belfuse.com

MEMS temperature-controlled oscillator

SiTime Corporation's Elite RF Super-TCXO is an MEMS based temperature-controlled oscillator. The new precision timing platform, EliteRF, simplifies timing architecture in wireless infrastructure. The device is built to withstand extreme environments. It enables higher bandwidth and lower latency, which is critical to future 5G and satellite communications deployment. The Elite RF Super-TCXO can replace the Mini-OCXOs that have been used for satcom radio applications. It is more rugged, consumes lower power, and requires lower external components, thus making the designing task cheaper and easier.

SiTime
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GNSS Super-TCXO

SiTime Corporation

www.sitime.com

Programmable clock generator

Renesas Electronics Corporation's VersaClock 7 is a programmable clock

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generator that combines low power consumption and cost-efficiency in a small package. The VersaClock 7 can simplify the system design by replacing multiple discrete timing components and lower costs by reducing bill of material and board space. It enables users to configure frequencies, I/O levels, and GPIO pins. The programmable clock comes in a compact space-saving package. Furthermore, the high levels of integration and the flexibility of programmability help manufacturers reduce component counts, saving board space and power. These features offer greater versatility in consumer, data communications, telecommunications, and networking applications.

RENESAS
VersaClock
Programmable
Clock Generators

Renesas

https://www.renesas.com

Battery charging IC

Infineon's ICC80QSG is a single-stage flyback controller for the safe and robust AC-DC battery charger. The IC offers a quasi-resonant mode switching in valley n (QRMn). Its QRM operation comes with continuous conduction mode (CCM) prevention and valley switching discontinuous conduction mode (DCM) in mid-to-light load. It features a reduced gate driver output voltage during burst mode, making it ideally suited for very low standby requirements under light load or no-load conditions with a remarkable standby performance over the whole operating range. The charging IC offers a comprehensive set of protection features, which enable engineers to design safe and robust AC-DC battery chargers for a variety of applications.

Infineon
Battery charging IC
ICC80QSG

Infineon

https://www.infineon.com

BOARDS AND MODULES

High-power bus converter

Artesyn NDQ900 is a non-isolated bus converter (NIBC). The digital DC/DC converter comes in an industry-standard quarter-brick format for 48V power conversion in compute and telecom applications. The bus converter can supply power of up to 900W with a high efficiency of up to 97% across a wide load range. The NDQ900 NIBC features a PMBus interface for flexible digital control and monitoring. The module also offers a remote-control function and a good power signal. The Artesyn NDQ900 is suitable for use in test and measurement equipment, data storage, telecommunication, high computing equipment, etc.

ARTESYN
NDQ900
Advanced Energy

Artesyn

https://www.artesyn.com

Gain blocks for radar

The CMX90G701 and CMX90G702 are positive gain-slope amplifiers that are suited to a range of radio frequency (RF) and wireless applications. Both the amplifiers are suitable for wireless applications operating in the 6 to 18GHz frequency range. The amplifiers are capable of compensating the system losses, thus eliminating the need for passive equalisers. Both devices deliver a small signal gain within the range of 9.5 to 11.5dB, a P1dB output rating of +10.0dBm, and a low noise figure of 3dB. These devices are fabricated using GaAs pHEMT process technology to achieve an optimal combination of high linearity, low noise, and low DC power consumption. The CMX90G701 and CMX90G702 are suitable for use in applications such as satellite communications, 5G fixed wireless access (FWA), microwave backhaul, radar, etc.

CML
CMX90
G701/G702

CML Microcircuits

www.cmlmicro.com

90W AC/DC power supply

RECOM's new 90W RACM90-K AC/DC power supply is a versatile power supply suitable for cost-sensitive applications. The 90W power supply can operate over a wide range of input voltages ranging from 85-264V AC and provides a tightly regulated single output of 12V, 15V, 24V, 36V, and 48V DC. The module is available in the industry-standard 5cm × 10cm format. The power supply features dual fuses on-board and offers immunity to surges for installation Class 3 and over-voltage category OVCIII. The module has been rated to operate at an altitude of up to 4,000 metres and can work over a wide range of operating temperatures from -40°C to +90°C. The power supply is suitable for use in demanding applications, such as medical, industrial, and household applications.

Recom Power

www.recom-power.com

Voltage regulator for CPUs

The new BMR510 is a 2-phase integrated power stage which delivers a continuous total output current of 40A per phase or 80A total with an efficiency of up to 90%. Compared to the previous model the upgraded module offers higher inductance in a smaller package, thus allowing a lower switching frequency operation. The module allows for remote monitoring and comes with protective features, including output over-current and over-temperature protection. The BMR510 is optimised for top-side cooling and is halogen-free. It can accept tri-state pulse width modulation inputs from the chosen controller and a separate enable input is provided. The device

A ROADMAP TO LESS WEIGHT & BETTER EFFICIENCY

MAXIMUM PROTECTION

EVs and autonomous vehicles require rugged and reliable electronic control of all systems, and PCBs. Keeping these sensitive systems protected whilst avoiding excessive increases in weight which might negatively impact battery efficiency is a key consideration.

HumiSeal conformal coatings remain the industry standard in protecting these PCBs from damage and failure due to debris, liquid and chemical attack, or humidity and gaseous damage.

HumiSeal OnBoard

WWW.HUMISEAL.COM

HumiSeal®

is suitable for providing power for silicon based chips which have a high current requirement, such as GPUs, CPUs, IPUs, high-end FPGAs, and high-performing ASICs often found in the latest AI applications.

Flex Power Module

http://www.flexpowermodules.com

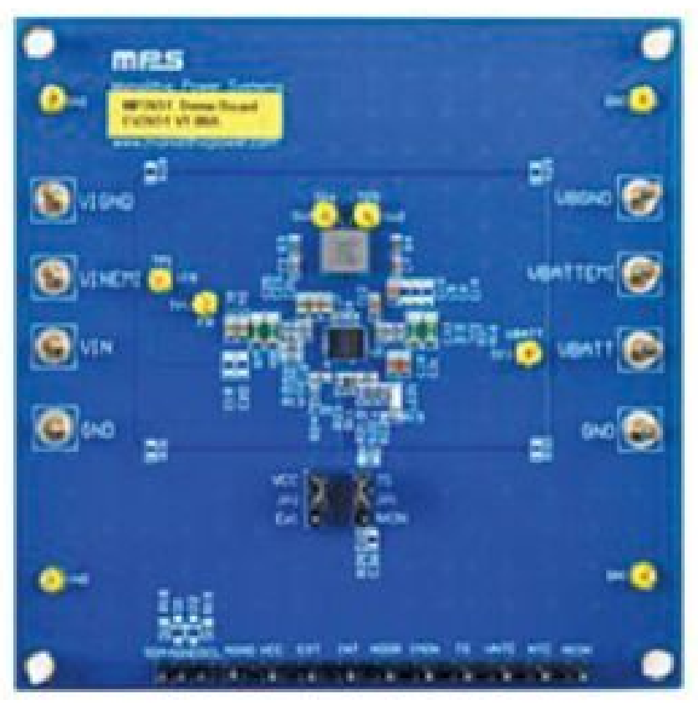
Exposed power module

EMIPAK PressFit power module from Vishay Semiconductors is designed to facilitate a reliable performance in rugged 15 to 150A applications. The module is optimised to offer higher performance at low temperatures. The module also features a temperature sensor for monitoring the temperature. It has an exposed substrate and optimised layout on the package that help to minimise stray parameters, allowing improved performance. The exposed design of the device also makes it easier for heat to vent out, which further improves the performance as well the product life.

Vishay Semiconductors

https://www.vishay.com

Evaluation board for charger IC



EV2651-VT-00A is an evaluation board for the MP2651 buck-boost charger IC. The MP2651 IC is designed for battery packs with one cell to four cells in series. The device can accept an input voltage (VIN) of 4 to 22V to charge the battery. It also supplies a wide 3 to 21V voltage range at the IN pin in source mode. This function is compliant with USB PD specifications. With the I2C/SMBus interface, the MP2651 can flexibly configure the charge and discharge parameters. The module can provide a charge current of up to 6A. It works at a switching frequency of 600kHz and offers an efficiency of up to 93.09%.

Monolithic Power Systems

https://www.monolithicpower.com

Power converters for transport

The ERM100 and ERM150 series are compact quarter-brick, fully encapsulated 100W and 150W DC/DC modules optimised for rail and mass transportation applications. The ERM100 and ERM150 quarter brick modules comply with multiple industry standards and provide reliable, high-efficiency solutions for rail system designers. Both converters have a European Railway Standard EN50155 compliant input voltage range of 36 to 160V DC. The modules have an efficiency of up to 91.5%, operate with a fixed switching frequency, and deliver a single, continuous power output. The ERM100 and ERM150 have no minimum load requirement and exhibit low ripple and noise characteristics. A baseplate that is optimised for contact cooling simplifies thermal management, while a heatsink version is available for designs requiring more stringent heat management.

Advanced Energy

https://www.advancedenergy.com

Asset tracking module

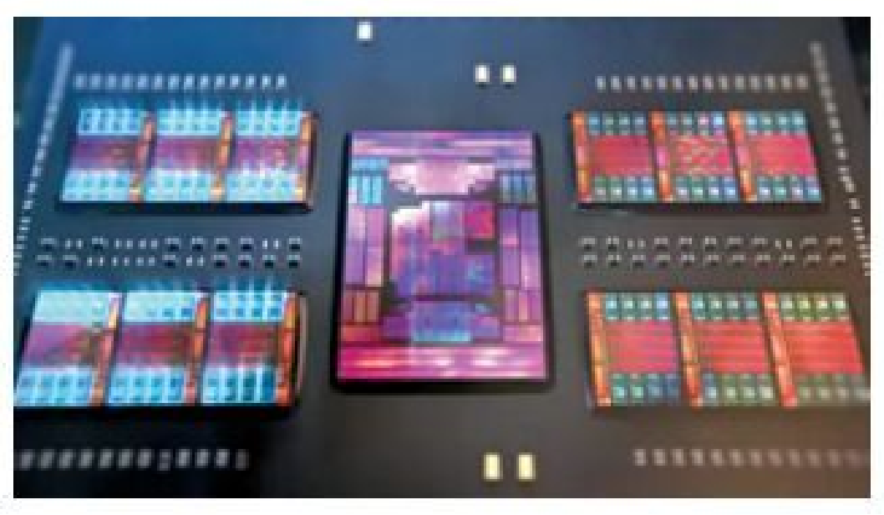
u-Blox ANT-B11 is the smallest antenna board which can accurately track an object using Bluetooth Angle-of-Arrival technology. The angle calculated by the antenna board does not require any additional processing, making the module ready for use right out of the box. The ANT-B11 board delivers high-precision direction finding and 2D indoor positioning that make it suitable for commercial tracking solutions and indoor positioning in mid-size spaces. The company also provides applications which allow the user to track an asset and plot their positions in applications aiming at 2D visualisation.

u-Blox

http://www.u-blox.com

EMBEDDED

Processors for data centres

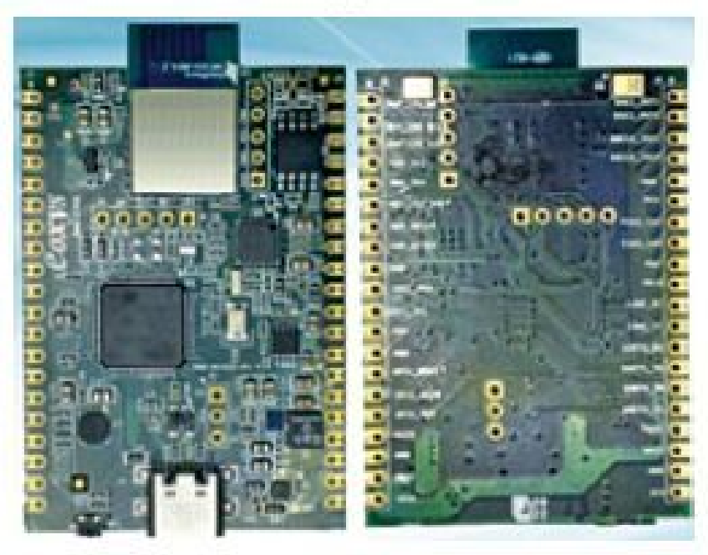


The 4th Gen AMD EPYC processors are designed for modern data centres. The processers offer energy efficiency and next-generation architecture which is essential for critical workloads across cloud, enterprise, and high-performance computing. The processors built on high-performing Zen 4 core from AMD also deliver energy efficiency and security. The 4th Gen EPYC processors feature twice the number of encryption keys compared to previous generations, thus keeping the data secure. They can provide up to 2.8 times more performance while consuming up to 54% less power. They also support DDR5 memory and PCIe Gen 5, which offers better speed for AI and ML applications.

AMD

https://www.amd.com

ML module for edge devices



The Xeno+ WiFi+BLE Nano ML module from Eoxys is developed to meet machine learning (ML) as well as artificial intelligence (AI) application requirements. The module offers leverage to customers with the onboard MICs and can also attach external MICs using a separate carrier board. The device is solderable and can be used as a core module for ML edge devices. It offers I2S and I2C connection options for customers to build their battery-operated ML devices. This device can be used for industrial automation, IoT, AI/ML, and deep neural network applications.

Eoxys

https://www.eoxys.com

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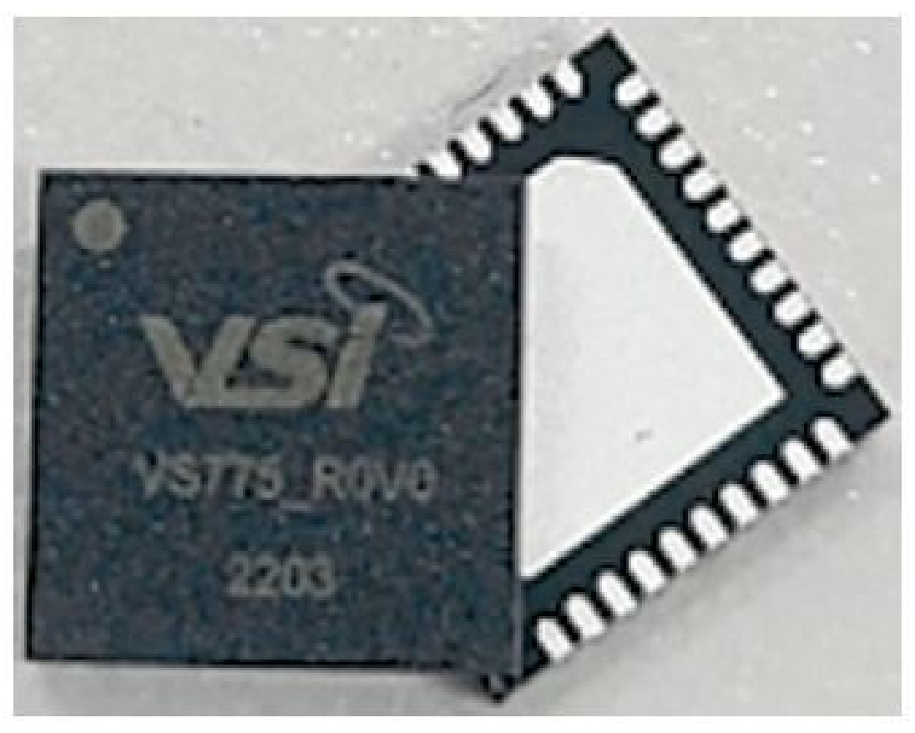
High-speed SerDes silicon

VS775 from VSI is the first commercial serialiser/deserialiser (SerDes) IC that complies with the ASA Motion Link standard. The VS775 provides a data transmission rate of up to 16Gbps so that the ECU can quickly process high-resolution image data collected by vehicle image sensors, especially electric vehicles and autonomous vehicles. The SerDes IC provides a commercial camera link semiconductor solution that will resolve the bandwidth concerns associated with using more high-resolution image sensors in advanced autonomous vehicle designs. The VS775 is a power-efficient IC in an ultra-compact size that can help designers build safer autonomous vehicles.



VSI
http://www.vsitech.co.kr

Module for V2X communication

Murata along with Autotalks have released Type 2AN, a wireless module that supports both the dedicated short-range communications (DSRC) and cellular V2X (C-V2X) standards of V2X wireless communication. The Type 2AN module is a highly robust module that can be employed in the most challenging of operating conditions. It is powered by a dual-core ARM Cortex A7 CPU capable of running V2X middleware and applications and an optional secure CAN microcontroller. The module comes in a compact size measuring just 38.5mm × 37.5mm × 8.5mm. It can be used in advanced applications such as early detection of unseen vehicles, traffic prioritisation and speed control, accident response, updates on road conditions, etc.

Murata
https://www.murata.com

T& M INSTRUMENTS

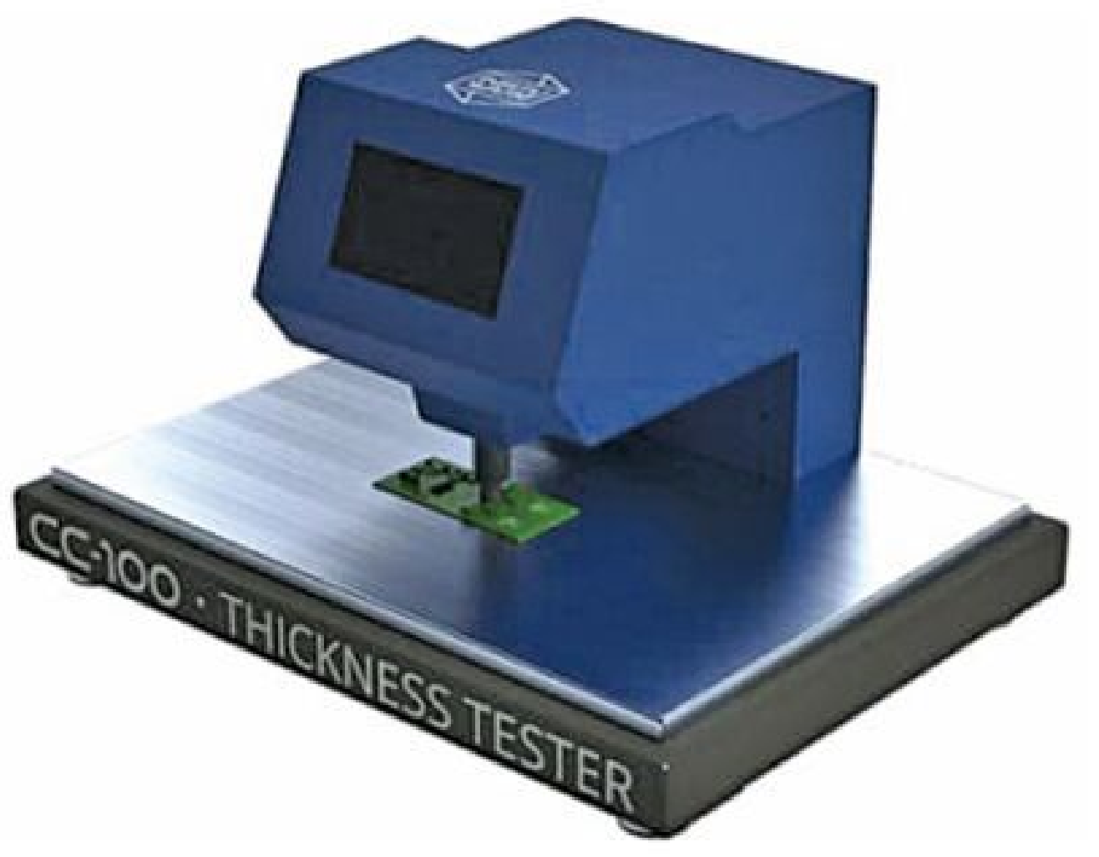
Radome and bumper tester

R&S QAR50-R is a fully automated turnkey solution for automotive radome and bumper testing based on the R&S QAR50. It offers high flexibility and is capable of accurately testing in the automotive radar frequency range at the end-of-line. The QAR50-R is a lightweight and flexible radome and bumper tester that offers higher throughput and yield than other devices. The new model combines the imaging capabilities of the R&S QAR and R&S QAR50 that allow for reliable and precise testing of large areas of the bumper. It is designed with a focus on compactness and low weight in order to be compatible with standard 6-axis robots. Due to its design, the R&S QAR50-R reaches positions that could hardly be handled with other available test systems.

R&S
https://www.rohde-schwarz.com

Conformal coating tester

CC-100 from Insituware LLC is a conformal coating thickness tester. It can measure the thickness of both wet and dry conformal coatings directly on production boards in less than 5 seconds. The thickness tester uses a chromatic confocal measuring principle to determine the thickness of transparent layers. The non-destructive and contactless testing method is fast and provides accurate results to help electronics manufacturers meet requirements for quality standards.



Insituware
https://www.insituware.com

MISCELLANEOUS

Solder paste for LEDs

Indium Corporation's NC38HF is a new solder paste suitable for advanced LED soldering applications. The paste offers consistent and tight solder deposits across multiple prints, enabling a better coverage of soldering paste and higher quality prints. This new formula also provides minimal voiding on tight pitch that allows for stronger joints even for small components. It is a halogen-free and no-clean solder paste which leaves no traces after the soldering process. The solder paste is suitable for mini/micro LEDs of COB, COG, SMT, and other LED varieties.

LEDPaste NC38HF
Solder Paste
LEDPaste NC38HF
Solder Paste

Indium Corporation
https://www.indium.com

Smart soldering system

The smart SELECT Synchro selective soldering system from Nordson Electronics is suitable for high-volume printed circuit board (PCB) assembly applications. The soldering system offers better cost-of-ownership and provides flexibility for electronics manufacturers. It can also improve throughput by 20-40% by employing a unique synchronous motion. Nozzles of different sizes and various solder pots are available to provide flexibility with solder quantities, solder alloys, and board designs. The smart soldering system comes in two models with the larger Synchro XL model capable of soldering boards up to 680mm × 2500mm in dimensions. The SELECT Synchro offers better yield and saves space for many through-hole and SMT boards.

SELECT Synchro

Nordson Electronics
http://www.nordson.com/electronics

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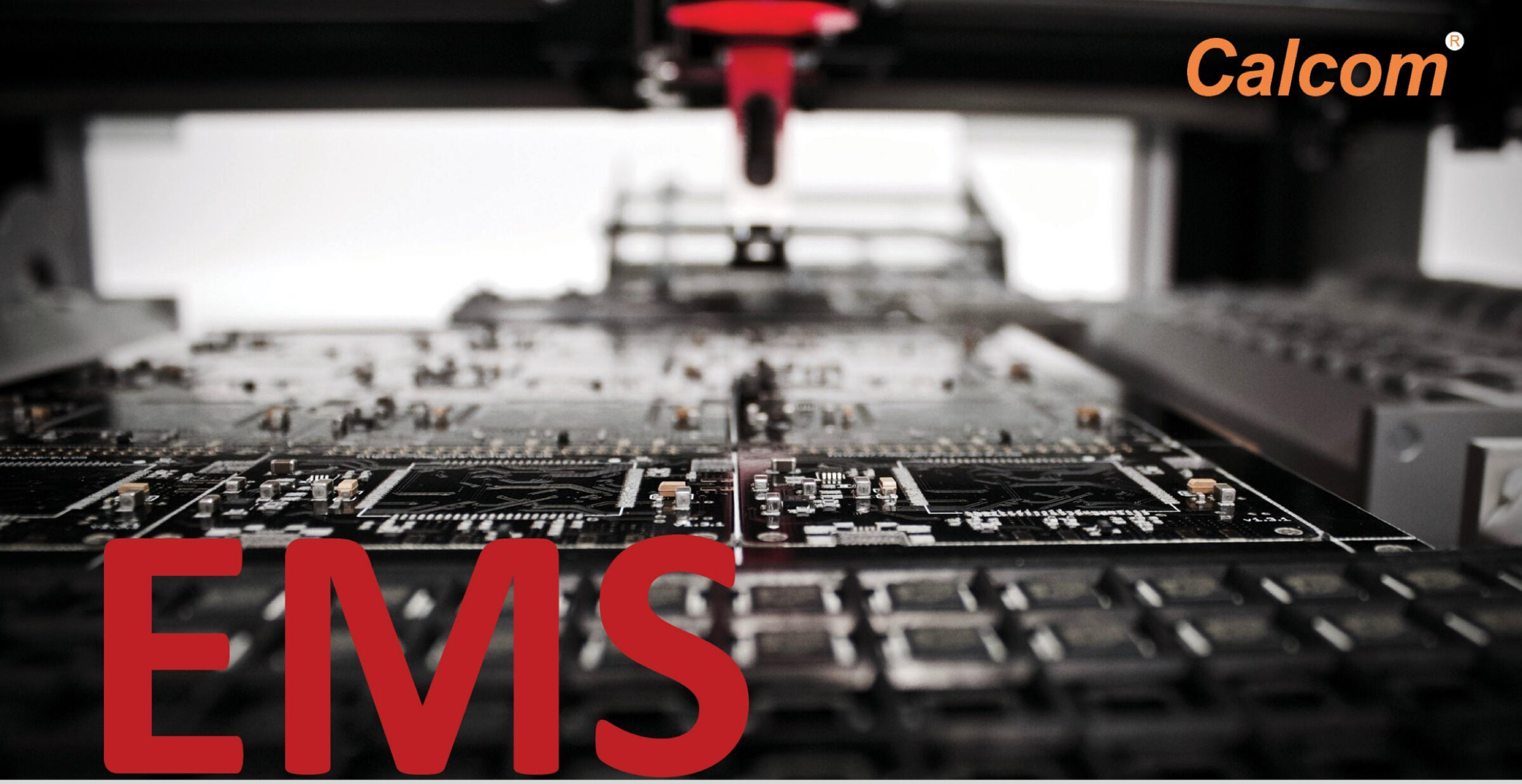

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ChatGPT: A Glimpse Into THE POWER OF AI

The capabilities of this chatbot are shocking! What's next?

ChatGPT is a chatbot developed by OpenAI that uses a variant of the GPT-3 (Generative Pre-trained Transformer 3) language model to generate human-like responses to user input. It is designed to be able to hold natural, engaging conversations with users on a wide range of topics

GUESS WHO?

GPT-3 is a powerful language model that uses machine learning techniques to generate human-like text. It has been trained on a massive dataset of web text, allowing it to generate coherent and relevant responses to user input. ChatGPT is built on top of GPT-3 and is specifically designed for use in chatbot applications.

One of the key features of ChatGPT is its ability to generate responses that are tailored to the specific context of the conversation. It is able to understand the overall theme of the conversation and generate responses that are relevant to the current topic. This allows it to hold engaging and natural conversations with users, rather than simply providing generic responses or repeating pre-programmed phrases.

Another key feature of ChatGPT is its ability to learn from the conversations it has with users. As it converses with users, it can use machine learning techniques to improve its understanding of language and become more adept at generating appropriate responses. This allows it to continually improve over time and become a more effective chatbot.

One potential use for ChatGPT is as a customer service chatbot, where it can assist

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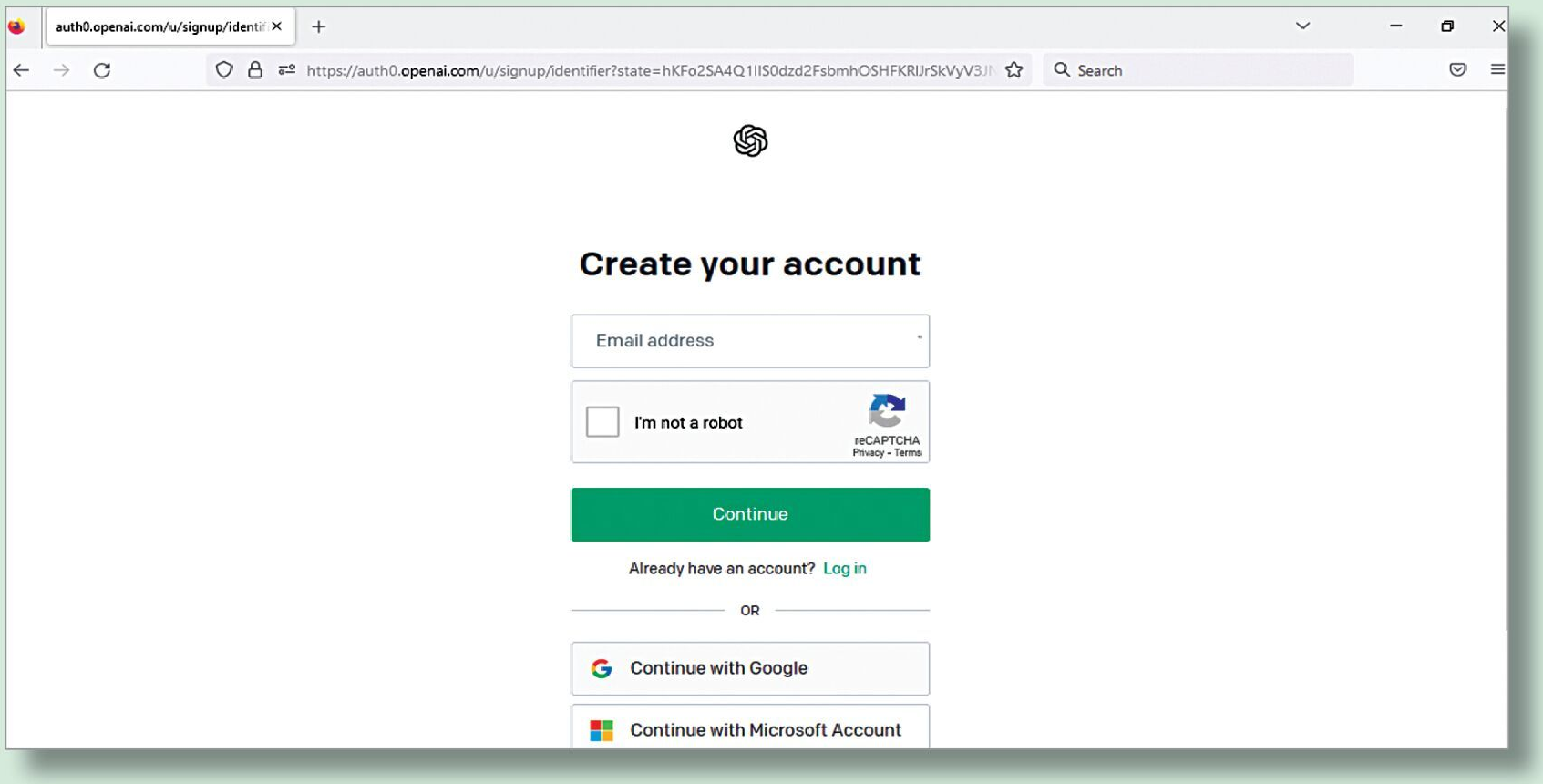
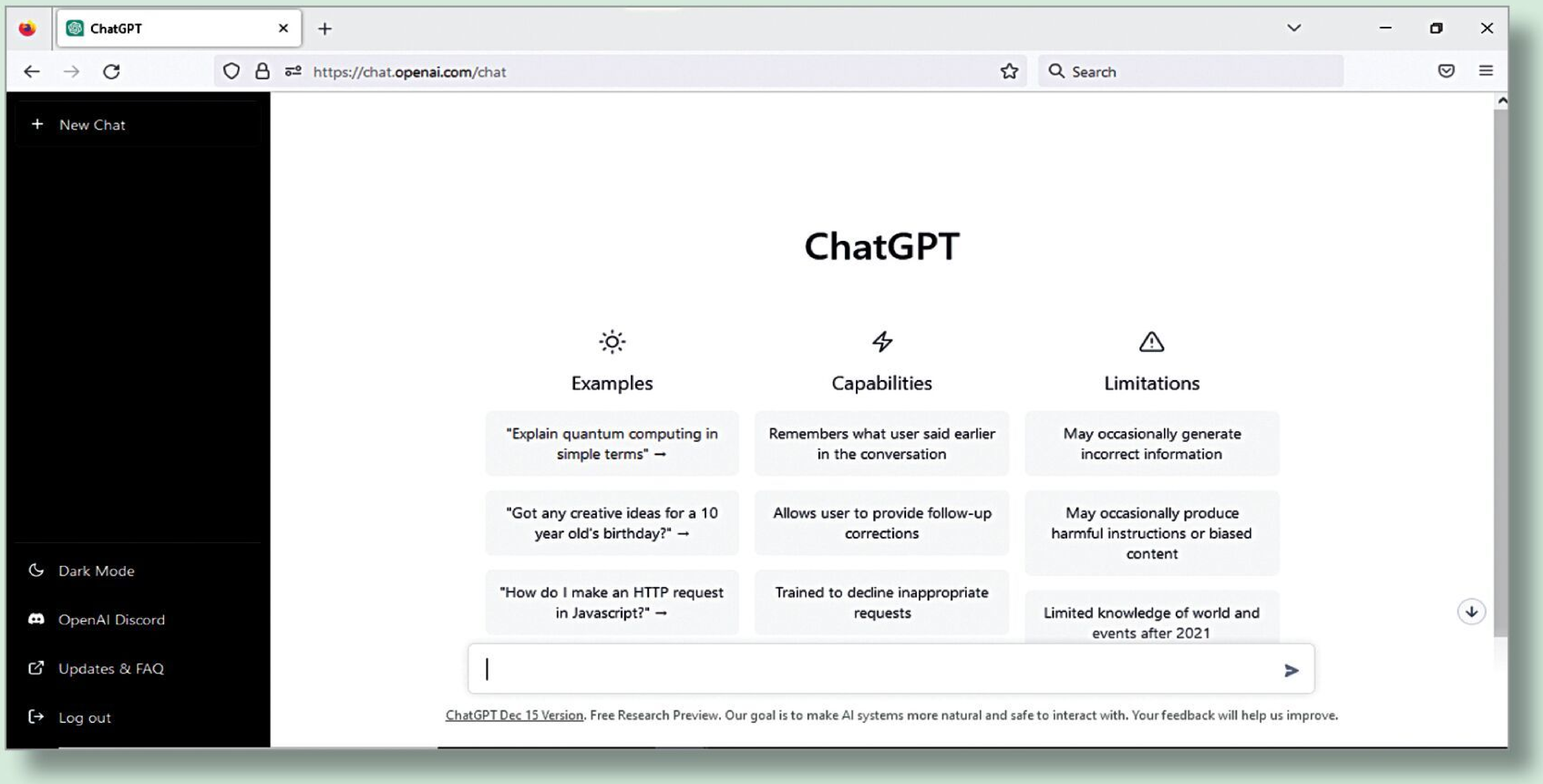
How To Use ChatGPT?

Below are some details on how an article can be written using ChatGPT:

1. Go to *https://chat.openai.com/auth/login* and sign up. Provide either your email ID and password, or use your Google or Microsoft account.


auth0.openai.com/u/signup/identif
https://auth0.openai.com/u/signup/identifier?state=hKFo2SA4Q1IlS0dzd2FsbmhOSHFKRlJrSkVyV3J
Search
Create your account
Email address
I'm not a robot
reCAPTCHA
Privacy - Terms
Continue
Already have an account? Log in
OR
Continue with Google
Continue with Microsoft Account

2. After signing up, you will see the dashboard shown below...


ChatGPT
https://chat.openai.com/chat
Search
New Chat
Dark Mode
OpenAI Discord
Updates & FAQ
Log out

ChatGPT

Examples	Capabilities	Limitations
"Explain quantum computing in simple terms" →	Remembers what user said earlier in the conversation	May occasionally generate incorrect information
"Got any creative ideas for a 10 year old's birthday?" →	Allows user to provide follow-up corrections	May occasionally produce harmful instructions or biased content
"How do I make an HTTP request in Javascript?" →	Trained to decline inappropriate requests	Limited knowledge of world and events after 2021

ChatGPT Dec 15 Version. Free Research Preview. Our goal is to make AI systems more natural and safe to interact with. Your feedback will help us improve.

customers with questions and problems related to a specific product or service. It could also be used as a general-purpose chatbot for social media platforms or messaging apps, allowing users to have natural conversations with a virtual assistant.

Another potential application for ChatGPT is as a language learning tool. By engaging in conversations with ChatGPT, users can practice their language skills and improve their fluency. ChatGPT could also be used as a language translation tool, allowing users to communicate with people who speak different languages by translating their messages in real time.

In conclusion, ChatGPT is a powerful chatbot that uses the GPT-3 language model to generate human-

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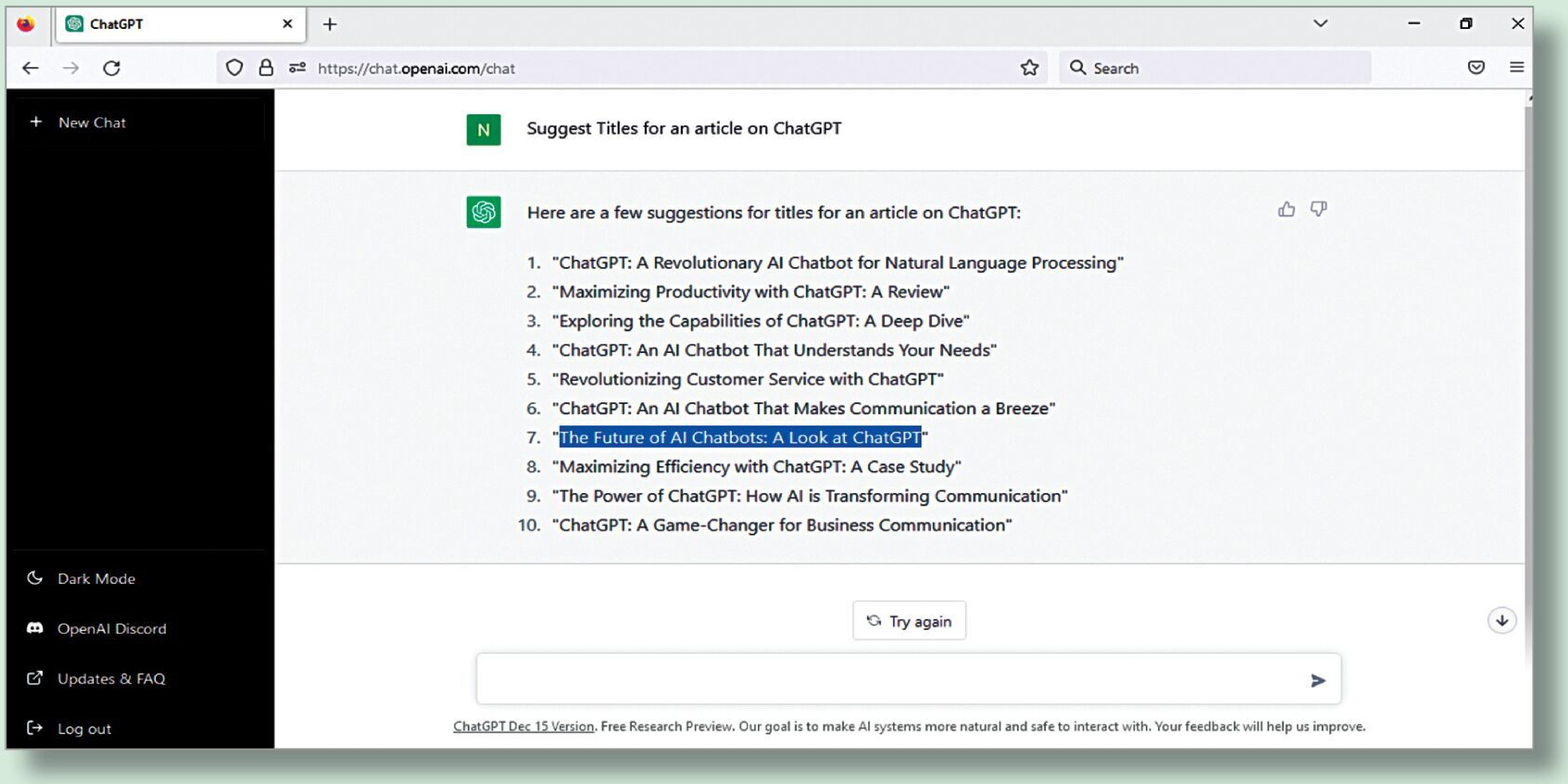
3. Start interacting with the bot as shown below:



N Suggest Titles for an article on ChatGPT

Here are a few suggestions for titles for an article on ChatGPT:

1. "ChatGPT: A Revolutionary AI Chatbot for Natural Language Processing"
2. "Maximizing Productivity with ChatGPT: A Review"
3. "Exploring the Capabilities of ChatGPT: A Deep Dive"
4. "ChatGPT: An AI Chatbot That Understands Your Needs"
5. "Revolutionizing Customer Service with ChatGPT"
6. "ChatGPT: An AI Chatbot That Makes Communication a Breeze"
7. "The Future of AI Chatbots: A Look at ChatGPT"
8. "Maximizing Efficiency with ChatGPT: A Case Study"
9. "The Power of ChatGPT: How AI is Transforming Communication"
10. "ChatGPT: A Game-Changer for Business Communication"

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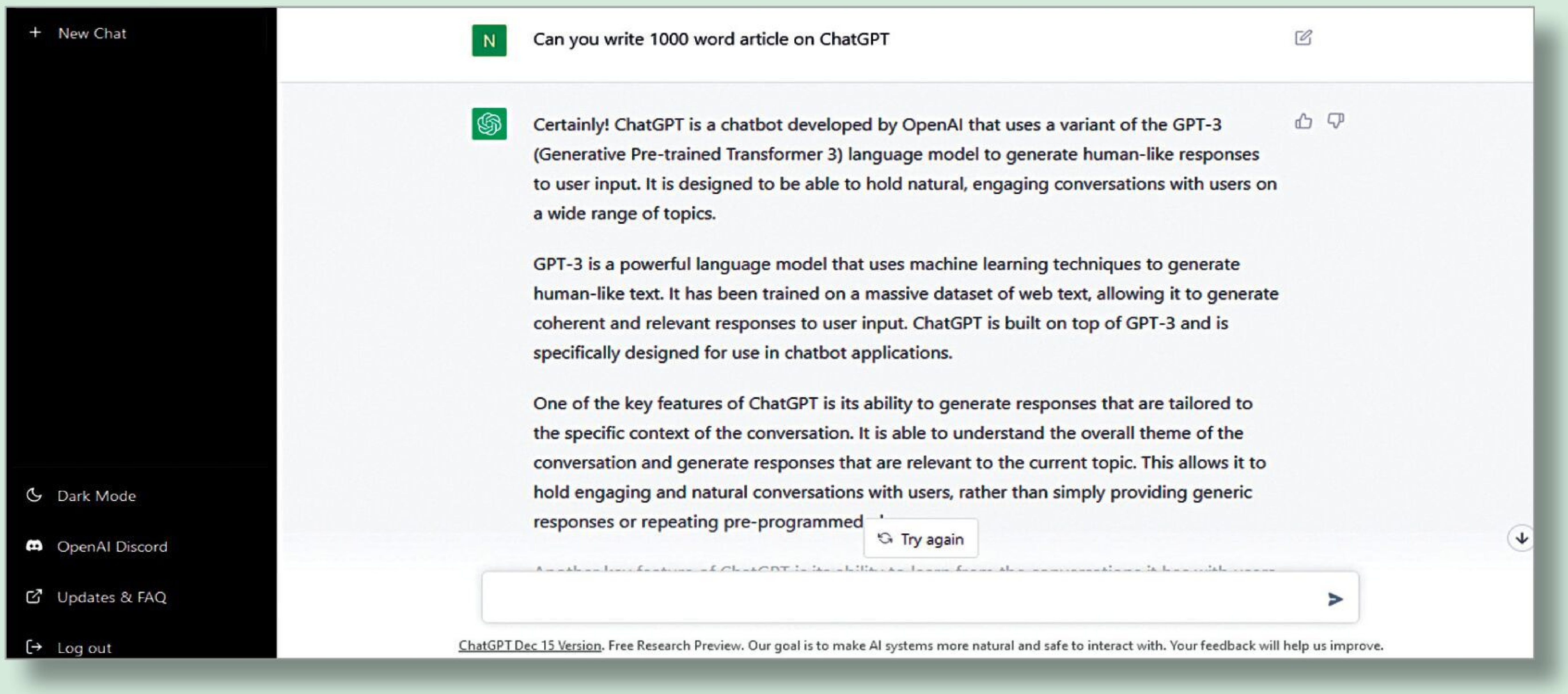
4. The two images below demonstrate how ChatGPT replies to your queries. And, how we made it produce this article.



N Can you write 1000 word article on ChatGPT

Certainly! ChatGPT is a chatbot developed by OpenAI that uses a variant of the GPT-3 (Generative Pre-trained Transformer 3) language model to generate human-like responses to user input. It is designed to be able to hold natural, engaging conversations with users on a wide range of topics.

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One of the key features of ChatGPT is its ability to generate responses that are tailored to the specific context of the conversation. It is able to understand the overall theme of the conversation and generate responses that are relevant to the current topic. This allows it to hold engaging and natural conversations with users, rather than simply providing generic responses or repeating pre-programmed

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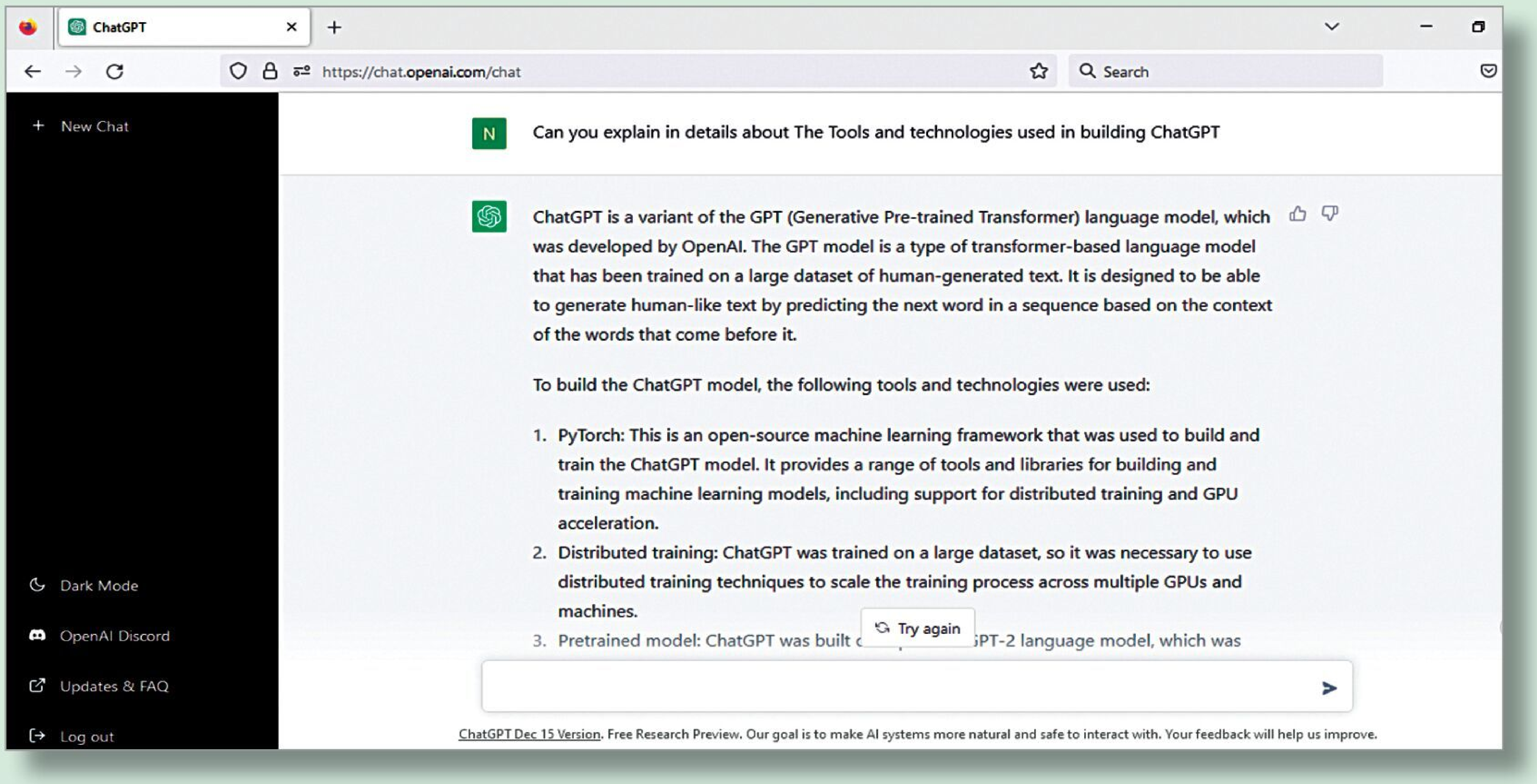

N Can you explain in details about The Tools and technologies used in building ChatGPT

ChatGPT is a variant of the GPT (Generative Pre-trained Transformer) language model, which was developed by OpenAI. The GPT model is a type of transformer-based language model that has been trained on a large dataset of human-generated text. It is designed to be able to generate human-like text by predicting the next word in a sequence based on the context of the words that come before it.

To build the ChatGPT model, the following tools and technologies were used:

1. PyTorch: This is an open-source machine learning framework that was used to build and train the ChatGPT model. It provides a range of tools and libraries for building and training machine learning models, including support for distributed training and GPU acceleration.
2. Distributed training: ChatGPT was trained on a large dataset, so it was necessary to use distributed training techniques to scale the training process across multiple GPUs and machines.
3. Pretrained model: ChatGPT was built c [illegible] PT-2 language model, which was

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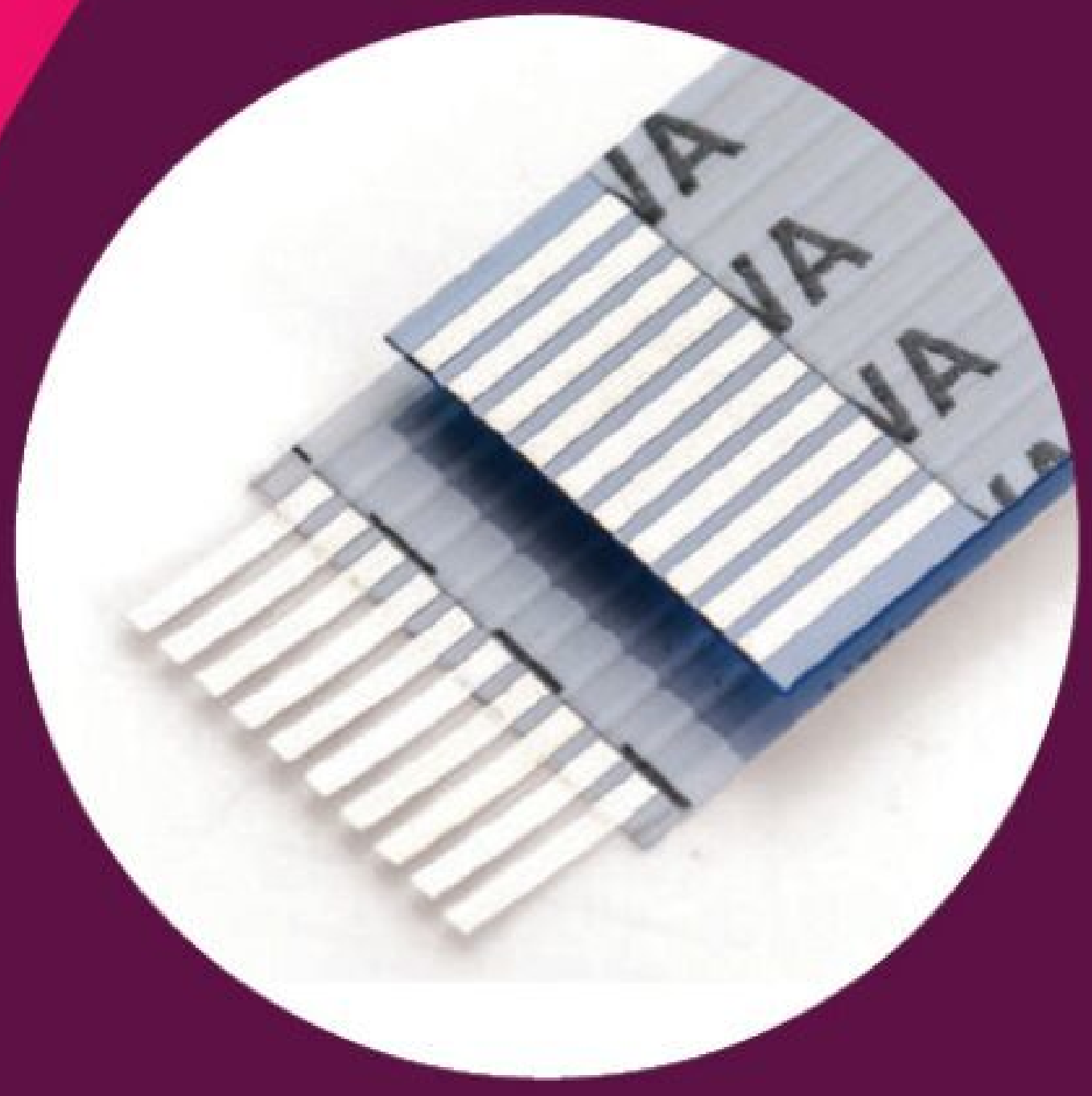
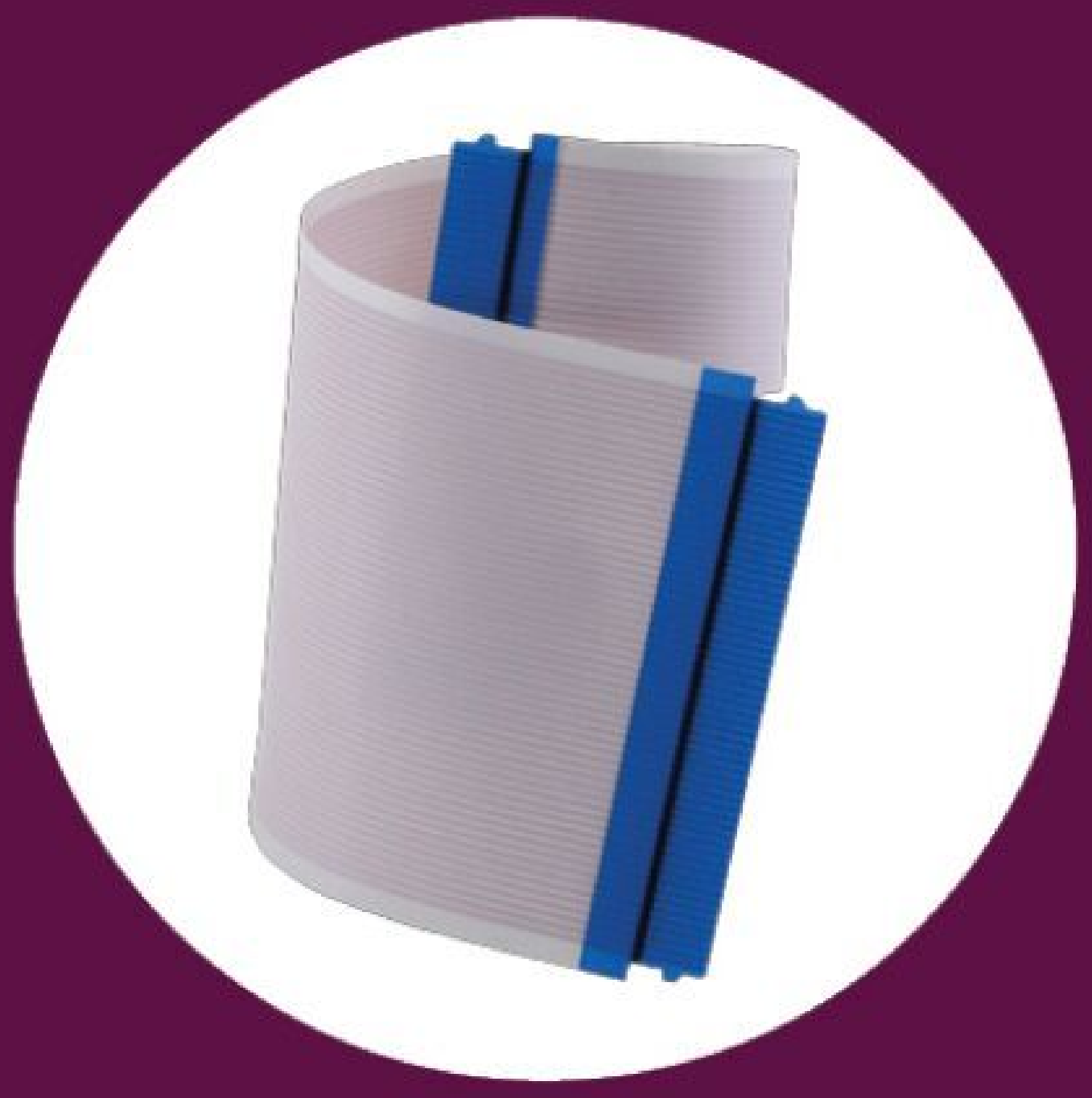

Open end Type for direct soldering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like responses to user inputs. It is able to hold natural and engaging conversations with users on a wide range of topics, and is capable of learning and improving over time. With its ability to tailor responses to the specific context of the conversation and its potential applications as a customer service chatbot, language learning tool, and translation tool, ChatGPT has the potential to revolutionise the way we communicate with chatbots.

The technology used

ChatGPT is a variant of the GPT (Generative Pre-trained Transformer) language model, which was developed by OpenAI. The GPT model is a type of transformer based language model that has been trained on a large dataset of human-generated text. It is designed to be able to generate human-like text by predicting the next word in a sequence based on the context of the words that come before it.

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2. Distributed training. ChatGPT was trained on a large dataset, so it was necessary to use distributed training techniques to scale the training process across multiple GPUs and machines.

3. Pretrained model. ChatGPT was built on top of the GPT-2 language model, which was trained on a large dataset of human-generated text. The GPT-2 model was used as a starting point, and then additional training data was used to fine-tune the model for the specific task of generating chatbot responses.

4. Data augmentation. To improve the performance of the ChatGPT model, data augmentation techniques were used to generate additional training data by modifying the existing training data in various ways.

5. Evaluation metrics. To measure the performance of the ChatGPT model, a range of evaluation metrics were used, including perplexity, which measures how well the model is able to predict the next word in a sequence, and human evaluations, where human annotators rate the quality of the model's responses.

Overall, ChatGPT is a complex machine learning model that was built using a range of tools and technologies, including PyTorch, distributed training, pretrained models, data augmentation, and evaluation metrics.

The capabilities

ChatGPT has been specifically designed for conversational language generation. It is a powerful tool that can generate human-like text based on a given prompt or conversation history. Some of the capabilities of ChatGPT are:

1. Generating responses to prompts. ChatGPT can generate responses to prompts or questions in a natural and coherent manner, allowing it to hold conversations with users.

2. Maintaining context and coherence. ChatGPT is able to maintain context and coherence in a conversation, allowing it to generate responses that are relevant to the conversation and follow its flow.

3. Generating diverse responses. ChatGPT is able to generate diverse responses to a given prompt, allowing it to provide a range of options or viewpoints on a topic.

4. Generating personalised responses. ChatGPT can generate personalised responses by incorporating information about a user or a specific topic into its responses.

Overall, ChatGPT is a powerful tool for generating natural and coherent text for use in conversational systems, chatbots, and other applications that require the ability to generate human-like responses.

The future of conversational AI

Conversational AI, also known as chatbots or virtual assistants, is a rapidly evolving field with a lot of potential for growth and development. Here are a few areas where we may see advances in the future:

1. Improved natural language understanding. Chatbots and virtual assistants will continue to get better at understanding and interpreting human language, allowing them to have more natural and engaging conversations.

2. Increased personalisation. As chatbots and virtual assistants gather more data about their users, they will be able to tailor their responses and recommendations more specifically to individual needs and preferences.

3. More complex tasks. Chatbots and virtual assistants will be able to handle more complex tasks and provide more comprehensive support to users. This could include tasks such as booking travel, managing finances, and more.

4. Integration with other technologies. Chatbots and virtual assistants will likely become more integrated with other technologies, such as smart home devices and wearable technology. This will allow them to provide even more personalised and convenient support to users.

Overall, the future of conversational AI looks bright, with many exciting developments and opportunities on the horizon. EFY

Who's The Author?

You might have found the content interesting to read and may have created a view that the author has deep knowledge of the subject but needs to improve on the writing style. Hold on....the article is not authored by any human being. It has been compiled word to word (with very little editing) from the chat interaction with ChatGPT. The complete article was written in less than 5 minutes by ChatGPT!

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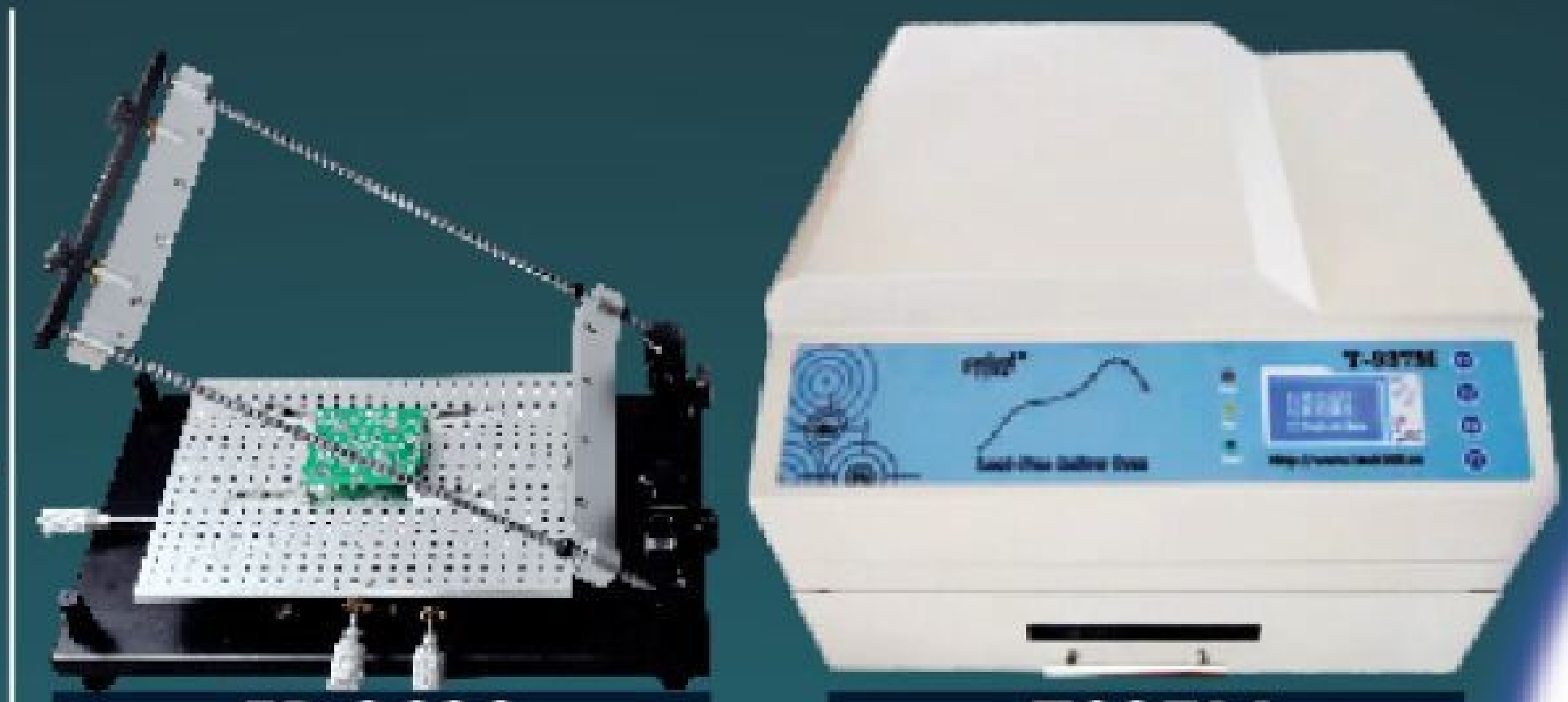

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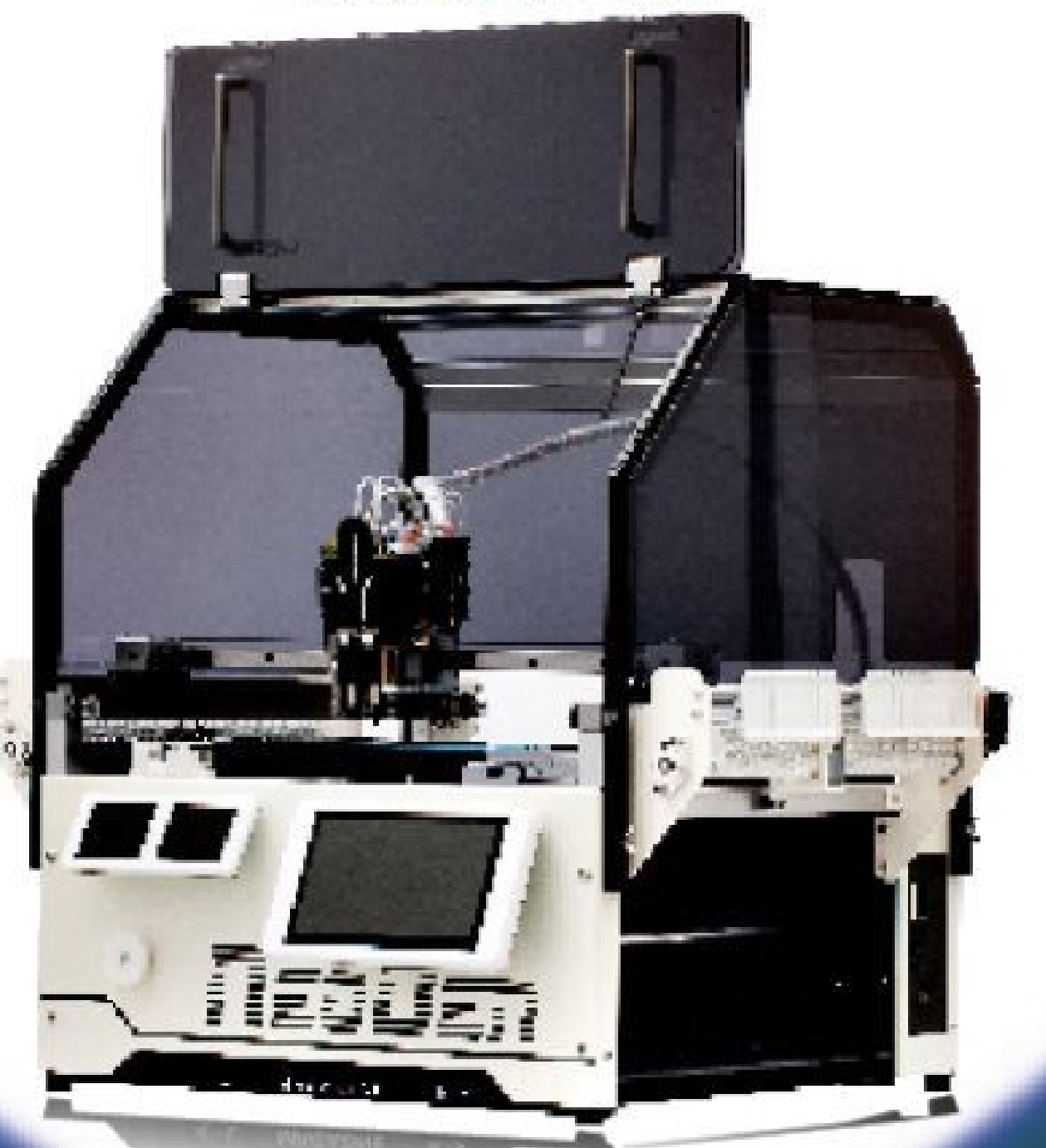

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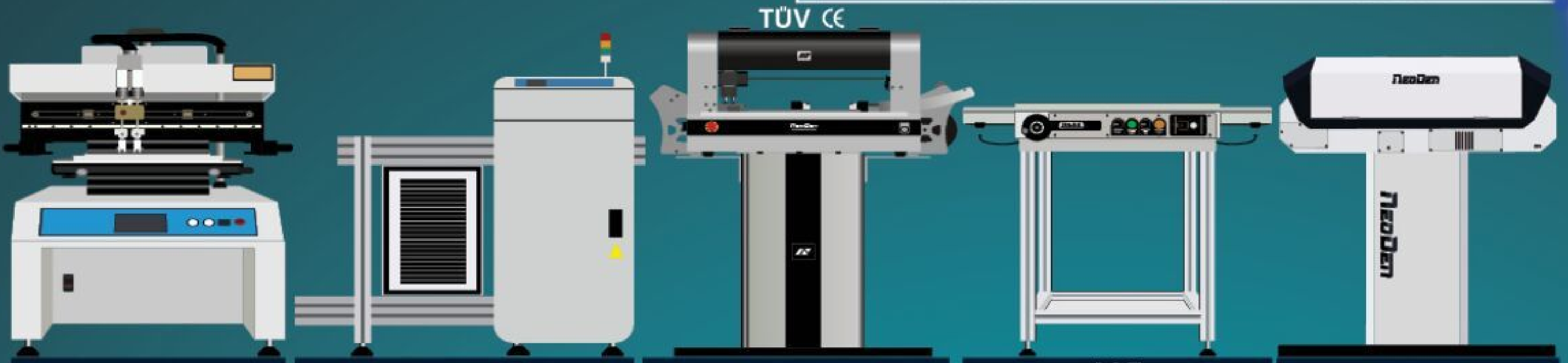

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CM-L250 SMT PCB Auto Loader Machine
NEODEN N4 SMT Pick & Place Machine
J15 External Linkage Conveyor
NEODEN IN6 Multi Zone SMT Reflow Oven

NeoDen
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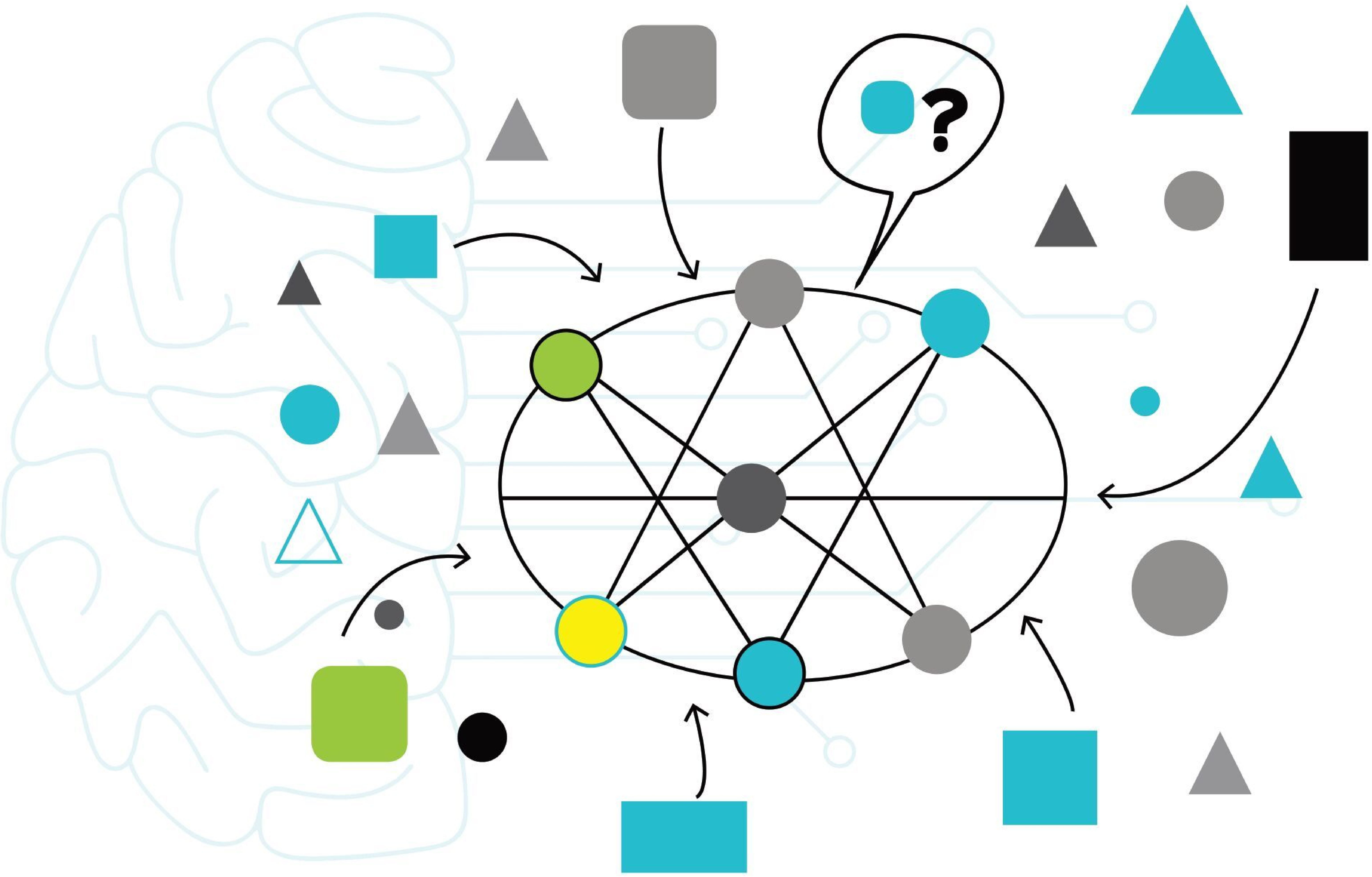
The Long And Short Of
FEDERATED MACHINE LEARNING

This article gives a quick insight into what is federated machine learning and why it's popular today



ADITYA MITRA likes working deep into various levels of the network. His areas of interest are IoT, networking, and cybersecurity.

GAUTAM GALADA is a deep learning researcher and likes working with emerging technologies in the field of AI.

A cloud refers to a server, public or private, accessible over a network, which is usually the internet. It generally has high processing power and storage, and is suitable for big computations. A cloud can be used to train AI models, but only when the data is available to it. On the other hand, since the cloud is generally a remote system, capturing data directly on it becomes difficult and not feasible. Capturing the data on local devices and transmitting it to the cloud does not always give real-time results. This is where the concept of federated learning comes in.

Federated learning promotes machine learning while the data is on the device. It handles a flexible architecture, which enables a secure process for sensitive data collection and model training. The world currently takes data privacy as an important responsibility. To introduce automation into fields like healthcare, biometrics, etc, real-time sensitive data is the core requirement. The important question therefore is: How do we train a model without collecting sensitive data from the users, storing it, and using it for training? To define optimal training for a machine learning model, relevance of data is an important aspect. Data is best when it comes directly from a source. But

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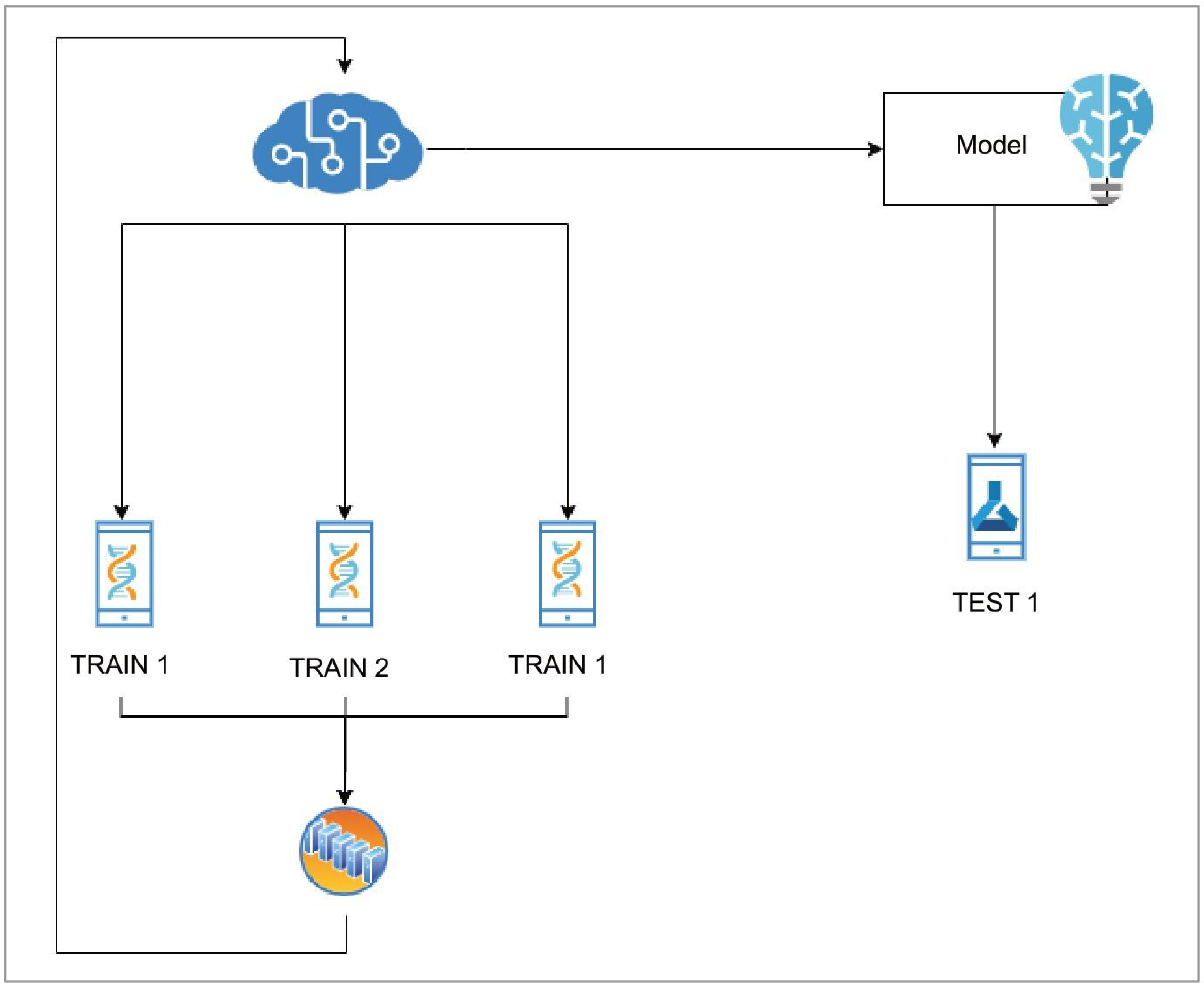

Fig. 1: Training model

the permission for data collection becomes an issue.

With federated machine learning, model training can be centralised on a decentralised data feed. The model is trained on the source device, and the device configurations are measured to see if it is able to train the model or not. Data sources are selected based on how optimally they can provide the data. Once the model trains on the device, it sends the training results (not the data) to the server. In a similar fashion, training results from edge devices are sent to the server. Each device has a training threshold to avoid overlearning or accessibility of unique data results, also referred to as 'differential privacy'. Simply put, the model 'trains enough to be unknown'. Model memorisation will not reflect to a particular user or device in general when we get differential privacy into the picture.

The model files are removed from the device once the complete model training is performed, to ensure no violation of privacy takes place. Server-device communication is pipelined with secure aggregation, which lets the server combine the results that are encrypted and only decrypt the aggregates.

A secure aggregation protocol masks the training results and scrambles them in such a way that all the results add up to zero. Once the training is successful and the results are sent to the server, the testing is carried out on other devices which were selected as data sources but not used. To explain it in lay terms, the "device acts as a data sample, some devices are used for training and some for testing."

So, where is federated machine learning being used? Facial recognition based applications, self-driving cars, concepts that involve reinforcement learning, and medical diagnoses are just a few of the fields it is being used in extensively today.

Keeping data secure

As evident from the above discussion, federated learning models depend on a centralised server (generally, a cloud) and a decentralised data feed (generally, edge and fog devices). Since the data processed is sensitive in nature, security must be ensured for the same.

There are three main security goals: confidentiality, integrity, and availability. Confidentiality implies that all the associated data, starting from the data feeds to even the model files, is stored securely and no unauthorised party can access it. Next, the data that is transmitted should not be tampered with or distorted in the process. This is what is meant by ensuring its integrity. Availability implies that the data and the model files should be accessible when needed.

Data can generally be secured by encrypting it and safely storing the encryption keys. Here, it is to be noted that data is to be encrypted mainly in transit when it is transmitted from the edge or fog device to the cloud. Remember that encrypted data may not be secure if the keys are not kept safely. So it is important to store them in key vaults and similar structures.

Here, it is advisable to use a public key cryptosystem, like RSA, where the server can announce its public keys and the edge devices can encrypt the outgoing data using these. The private keys, which are safely stored in the server, can be used to decrypt the same data when it reaches the server.

With the emergence of Web 3.0 and decentralisation of data, federated learning is a promising way to train AI models without hampering the user's privacy. The data is processed locally on the user's device and only the results are shared, that too in a secured manner. This technology can be implemented in fields where privacy is of utmost importance, such as in healthcare, banking and fintech, military areas, processing of biometric information, and so on. EFY

This article was first published in August 2022 issue of Open Source For You magazine.

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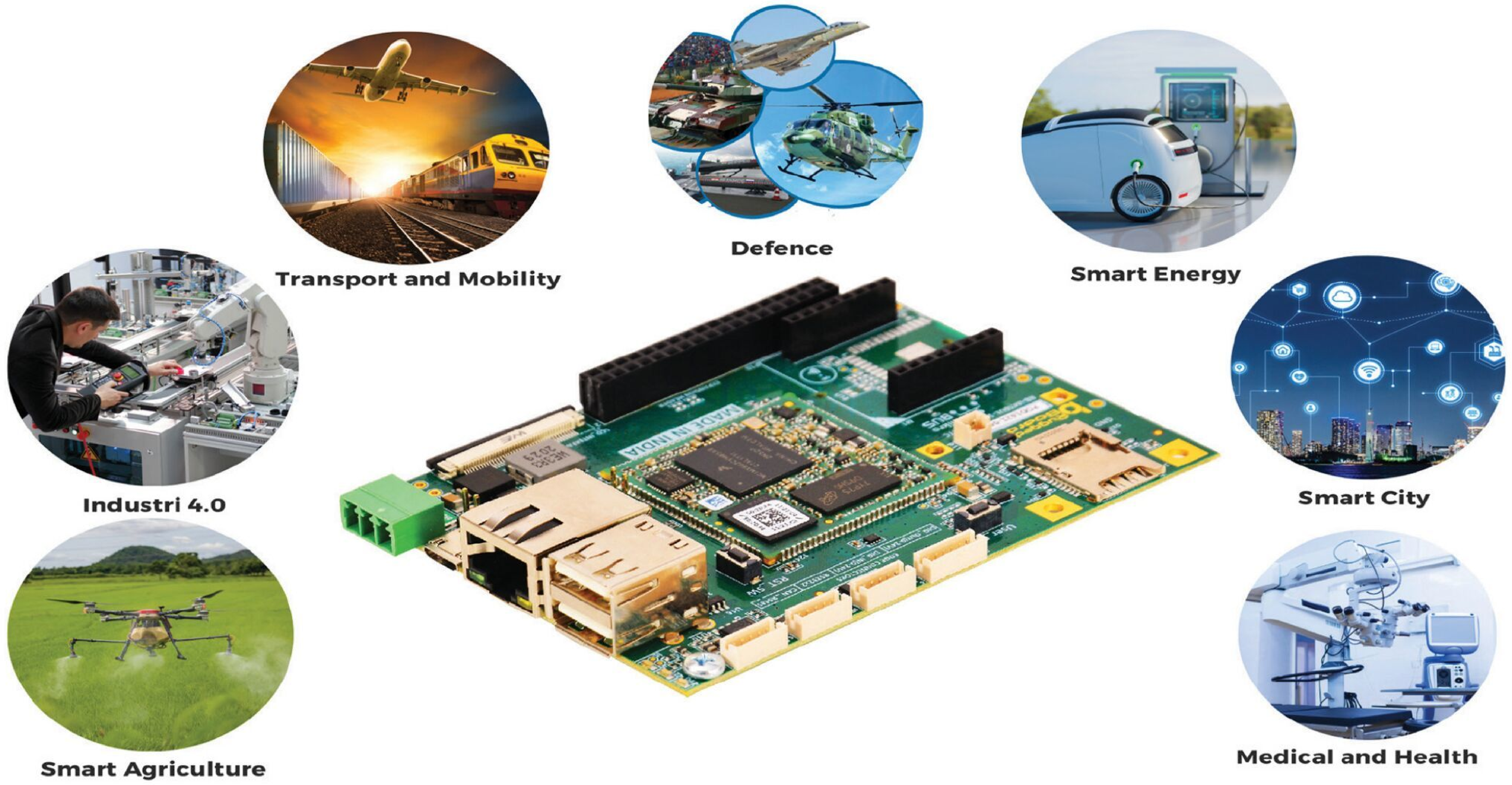
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“NON-FREE PROGRAMS Are A Threat To EVERYONE’S FREEDOM”

RICHARD MATTHEW STALLMAN

Richard Matthew Stallman (*aka* RMS) can be best described as a genius or a maverick. He graduated from Harvard in physics while working at the Artificial Intelligence Lab in Massachusetts Institute of Technology. In 1984, he started developing the GNU operating system, then in 1985 he founded the Free Software Foundation and invented the concept of copyleft—a legal mechanism to protect the modification and redistribution rights of free software.

How have things progressed? How happy is he with the current state of affairs? Given the increased awareness and use of free software, we had (wrongly) assumed that he would be happy with the progress. He not only reiterated the weakness in defence of freedom but also outlined the threat humanity faces when “progress” (in the purely practical sense) is promoted at the neglect of freedom. Let’s see what he has to say

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For the benefit of our readers, who are new to the concept, what exactly is 'free' software?

It's best described by the phrase, "Free as in Freedom, and not Free as in Free Beer." So, when I talk about free software (*aka Swatantra* software), I am not referring to the cost of the software but to the level of freedom it provides to the user.

How satisfied are you with the progress in the free software world?

We are moving towards horrible tyranny. People are being pressurised to use devices having non-free software for their day-to-day activities. And non-free software is malware. We have listed over 500 examples on *gnu.org/malware*. If a company has control over the software you are using, then it is almost sure to use that control to mistreat you. However, it is possible to refuse, as I do that myself.

I refuse to have a portable phone as every portable phone is a tracking device, which can be modified into a listening device. These so-called smartphones—I call them 'snoop' phones—invite you to talk to various online services or 'disservices.' But in the process, they snoop on you terribly; they can manipulate and pressurise you. It's not an acceptable kind of technology.

How do you define malware?

Malware is software designed to mistreat, harm, or annoy the user. Users might be expected to stop this abuse if they could control what the software does.

Do you consider marketing messages as malware?

Yes, because most users tend to turn those off in the settings. Software taking user permissions during installation is a racket. Users often don't understand what a program will actually do. But also in many cases, the choice is, either give permission for the program to do all these things, or it doesn't work at all.

How is then the choice of users determined?

Suppose there are no taxis anymore. And the only kind of vehicle you can get is a Uber car. So then, when the Uber app says that it will track your location, to what extent is this a choice? In a theoretical and some literal sense, it's a choice. And I prove that because I absolutely refuse it; I boycott Uber. But most people don't believe they have another choice.

Practically speaking, in society as it is now, it's not optional. If your boss or your school asks you to use certain software, say, if they tell you to use Zoom, which has malicious functionalities (like the company Zoom can cut off your discussion, can also snoop on you), what will you do? There may be another side we don't know about. We haven't looked through the source code.

So, malware of non-free software is a real injustice which, in practice, people can't easily escape. This is an outgrowth of the free software issue, because when the program's not free, the developer will make it malware. S/he has an interest in making the program malware.

What could be the alternative to such services in the free software world?

There are some services which ask for your location in order to provide you with the service. Though the service and the app are different, they're tightly associated and go together. The way things are you can't use the service without the app. But they're still conceptually distinct. And both carry out their own bunch of injustices.

I object to being required to identify myself to get a ride. With a taxi, I don't have to. Because I'm going to pay cash. Uber won't accept cash. I say any business that won't let you pay cash, unless it's for something very expensive like buying a house or a car, it's an injustice.

In general, a house owner or a car owner has to be registered. But a person taking a ride downtown today does not have to be registered, and in a free society must not be registered. The practice of tracking where people go is the kind of surveillance that puts all human rights in danger.

The most dangerous things to surveil are where you go, what you do there, and whom you're talking with. If those things are surveilled, human rights are gone. So that's my ultimate objection to any company that acts this way.

Now, in principle, digital payments can be anonymous. In fact, we've developed free software to make anonymous digital payments; it's called the GNU Taler. Switzerland seems to be very interested in using it as it has a tendency, to some extent, to oppose tracking people.

So, if there was something like Uber where I could request a ride without having a mobile phone and without running any non-free software (like calling someone), and if I could pay using free software like GNU Taler where I'd be paying digitally through the internet but not identifying myself, that would be okay for me. I would be willing to use that.

Are you saying that digital cash, like the RBI introducing digital currency, is not a problem as long as it can be done without identifying users?

Digital cash is an ambiguous term because it means many different things. Taler is not digital cash, it's digital payment. You get other tokens that are denominated in

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some currency. The point is that you have a way of paying.

Totally anonymous payments have a problem as they lead to hiding lots of money from taxation, helping the rich steal from everyone else. We don't want to cause that problem. I think digital payments are okay if the payer is anonymous. Here's a crucial point. With GNU Taler, the payee is always identified and hence, it does not promote tax dodging.

We identify the payee. So, if you paid for a service, it'd get something that it can submit to a bank or a similar entity, and get exchanged for money. This way, the transaction would get recorded with the bank.

How does GNU Taler differ from cryptocurrencies?

GNU Taler has several advantages compared with cryptocurrencies. First, it doesn't fluctuate relative to the currency. And you'll avoid the speculation of cryptocurrencies. I've never used crypto; I don't like speculating.

Another difference is that it's more anonymous for the payer. With Bitcoin at least, every transaction is public because there are ways of figuring out who owns or uses a particular wallet. And the other thing is that it's always identified for the payee. And it's also much more efficient.

How does it prevent the payer's information from being stored?

It uses blind signatures. Using an algorithm similar to RSA, you can arrange for someone else to sign a number for you and not know what number is signed. Essentially, you take a number and multiply it by a large prime and submit the product to be signed. Since you know that it's signed in a certain way, such that you know what the two factors were, you can deduce the signed version of the original number by dividing out that other prime. So, you now have a token that can be validated by the bank. But no one can tell that it came through you.

When I buy a car, it now comes with non-free software and spyware. What's the respite then?

Nowadays, there are connected cars which have cellular data communication. And if that's operating, it can determine its location if anyone tells it to. But not if you disconnect it. Also, the GPS system, which shows you where you are, probably remembers all your locations as well. If you get the car serviced, someone can look in that and find out wherever you've been. That's the road to tyranny.

You wouldn't want any government to have that kind of power. But if you disconnect the GPS antenna, then it won't know where you are and obviously won't remember your locations. For each antenna, you have to either disconnect it or cover it with some sort of metal foil—a conductive foil that doesn't let radio waves through.

Those are the only things I believe you need to do. Though this is theoretical, it would be very interesting for people to try and verify that the system stopped working. One nice thing about these methods is that you can easily revert things back to how they were.

There is an increasing trend where car companies are providing cars as a service. Toyota, for example, had proposed to charge $80 a year just for the facility of remotely locking and unlocking your car. BMW is offering heated seats in their cars as an optional service.

This is malicious; it's nasty behaviour. Selling you something that you cannot change is always

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bad. If you've got a car and you've just connected the data link antenna, then those services would work anyway. But if you disconnect, the related services won't function. That's what you got to expect.

What are your thoughts on the emerging concept of the Internet of Things?

Well, we should respond to that with disgust. At the outset, I call it the Internet of Mal-things, or the Internet of Stings. Because although it's not inevitable that they must be malicious, they are.

In particular, if anything is designed so that you use a snoop phone to give commands to a device, and the commands pass through the manufacturer's server, that means everything between you and the device is being snooped.

What is the way out of this scheme of things?

The freedom-respecting way to design such a product is that your computer should be communicating in some local way and not over the internet. Any device in your house that talks though the internet is a Mal-thing almost certainly, because it enables snooping on you without any special effort. The devices that you accept into your house should not have any way to talk to the internet, but only to your computer. That way, you have total control over what commands you send to those devices.

Any device that has software which can be changed by someone else but the user is already so unjust. It locks you out and turns the device against you. We must fight against this scheme of things where someone else can send commands to that software and you don't know. They're very likely to put in a universal backdoor just so that they can change the software. Why would they respect any of your freedoms? I don't accept such things in my house.

Where do the values diverge between open source and free software?

At the outset, I'd like to clarify that free software doesn't mean *muft* software, but *swatantra*. We talk about the essential freedom for all users. The idea of open source was invented in 1998, which is 14-15 years after I started the free software movement. It describes the same practices that were already there in the free software community.

They have the same activities, but different values. With the free software movement, the values are freedom and community. We cooperate so we can all do things and have freedom. Open source doesn't talk about freedom at all.

What does the concept of open source talk about, then?

They talk about openness. But openness is narrower and shallower than freedom. Openness just means you can see what the software is doing. Now, when you look at their criteria, it's almost equivalent to the free software criteria. But that's not part of the word 'openness.' They don't make that a matter of principle.

Around the year 2000, they talked about the possibility of making practically better software by allowing everyone to participate in studying it, looking for flaws, fixing them, and so on. They didn't declare a good, convenient but non-free program as an injustice for your freedom's sake. They didn't refuse to use and develop that. They didn't fight it. That's what we did.

We said that if the program's not free, it is an injustice to its user. The users are entitled to have control over the software that does their computing.

Please elaborate on these kinds of licenses.

Copyleft is a technique of licensing that I invented because I wanted to make sure that the modified version of my programs will also be free. I use the copyright law as a basis for a license that says: You are given the permission to release and modify the versions of these programs as long as they're under the same license.

There are other free licenses also, that respect the core essential freedoms, but they do not have that requirement. I generally call those lacks, permissive, and weak licenses. So, they are not copyleft licenses. But the programs released under them are still free software and are also open source. But modified versions of them can be non-free.

This is why you need to be very careful when somebody says something is based on free software. It could mean they could have taken a program that is not copyleft-ed and modified and released it as non-free software.

It could also be possible that they took good GNU plus Linux distributions, some of which are free. Suppose they take one that's free and then add some non-free programs. Now, it's not false to say that it's based on free software. But that doesn't mean it respects your freedom.

How to identify if something is truly free software or not?

We have a list of thousands of free programs in the directory at fsf.org. And we're always looking for more people to help update the software directory for the highest-possible accuracy and new additions. Because there are still thousands of free programs that are useful but unlisted. Any volunteer can just go to the site and contribute to the directory. We also rate GNU/Linux distributions and other system distributions in the same sense. Some are 100% free, that is, *swatan-*

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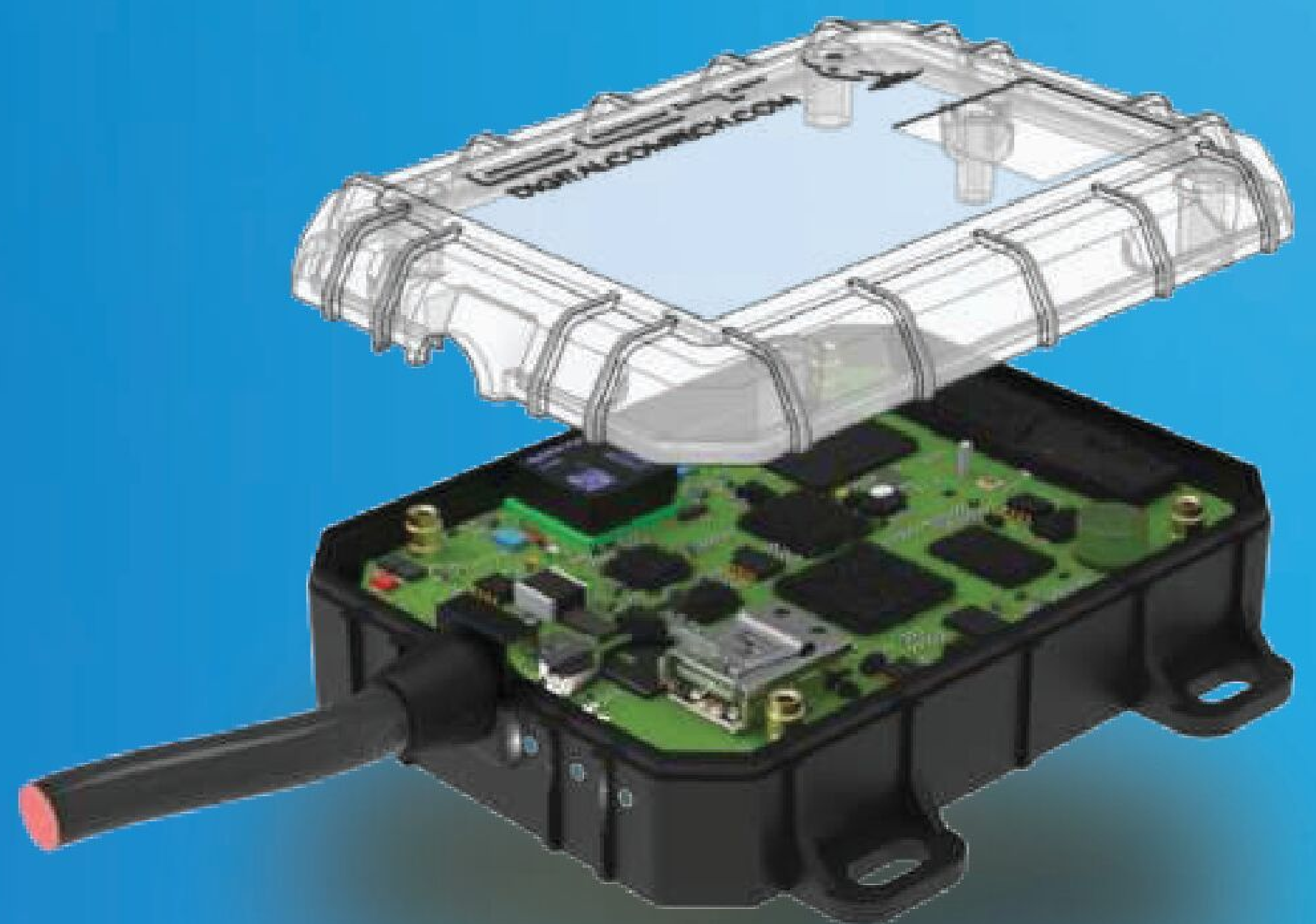

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tra software. You can look at *gnu.org/distros.*

Your journey with FSF had some issues in the recent past. Is there anything that you want to share with your audience?

I resigned from the FSF presidency and Board in September 2019. And I rejoined the Board in 2021. And I'm still on the Board, but I'm not the President. The FSF is learning to get along without me as President, which it eventually has to do.

It's well known that people started spreading lots of accusations against me, which were mostly false or based on partial truth. I'm not perfect, but I didn't do anything really horrible. But some people pointed out little things about what I say and do and turn them into something horrible. And if you want to read about this, you can look at the Stallman support network which refutes lots of falsehoods.

What do you think FSF India needs to learn from the US or the global counterpart in terms of implementation?

FSF India is not very active. It started as a separate organisation in the early 2000s, but it never really started functioning effectively. At this point, I think it'd be necessary to find a new set of activists who want to carry it forward. Some activists in it are still active in the free software community but FSF India as such is not doing anything.

What are the goals that you would want FSF India to have?

Teach people about free software at the practical level and at the level of ethical philosophy. Convey why it's very important, not merely as a matter of convenience, but as to what is at stake here.

And what is really at stake here?

Freedom is at stake here. Fundamentally, it starts with the freedom to control the software that does your computing. If you let your computing be done by somebody's online service, neither do you control what's running that service nor can you have a way to control it.

How to take that computing into our own hands?

If you want to use Google Docs, there's software on the server that has to be there. And obviously, Google can't let you change that software. Because different people might want different changes, and that doesn't make sense.

But if each of us is free and each of us has the source code, the programmers among us who want the same changes as we want, can get together and make a change.

It's up to you which version you're going to install and use. This is why free software means you can get what you want. And it's under your control. Otherwise, the software is under the control of somebody else, who is probably looking for an opportunity to mistreat you with it.

Looking at *gnu.org/malware*, you'll see how many different ways they mistreat people with it. They design non-free programs to restrict people (digital restrictions management). They make people give personal data in order to keep using it. There are famous online disservices which swindle people and get them addicted. And partly that's the fault of the server code. But the client code is also involved. If the client code were free software, you could change it and overcome some of the addictive aspects.

So, software freedom, in the direct sense, is freedom in one area of your life. But the more software and computing become involved in other areas of your life, the more software freedom becomes essential to freedom in those areas. EFY

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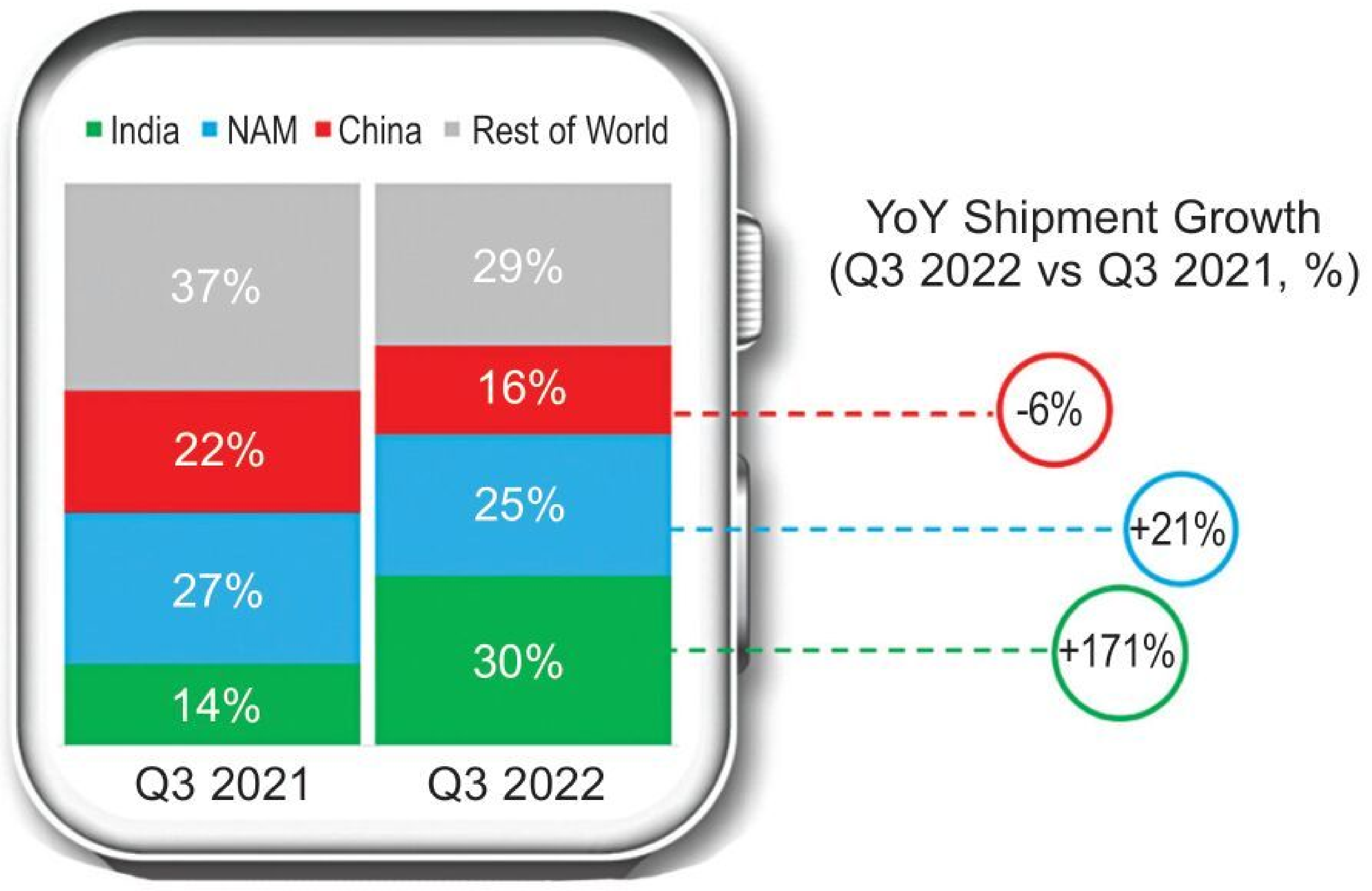
THE DASHBOARD

India Becomes Top Smartwatch Market in 3Q22

As per reports, the global smartwatch market grew 30% YoY in the 3Q22. India itself grew 171% YoY this quarter and stood first in the global smartwatch market. Notably, the Chinese market decreased for the fourth consecutive quarter, falling 28% YoY this time. Among the HLOS smartwatches, Apple and Samsung took up a little less than three-fourths of the market share. In the basic smartwatch segment, Noise stood first and Fire-Boltt second.



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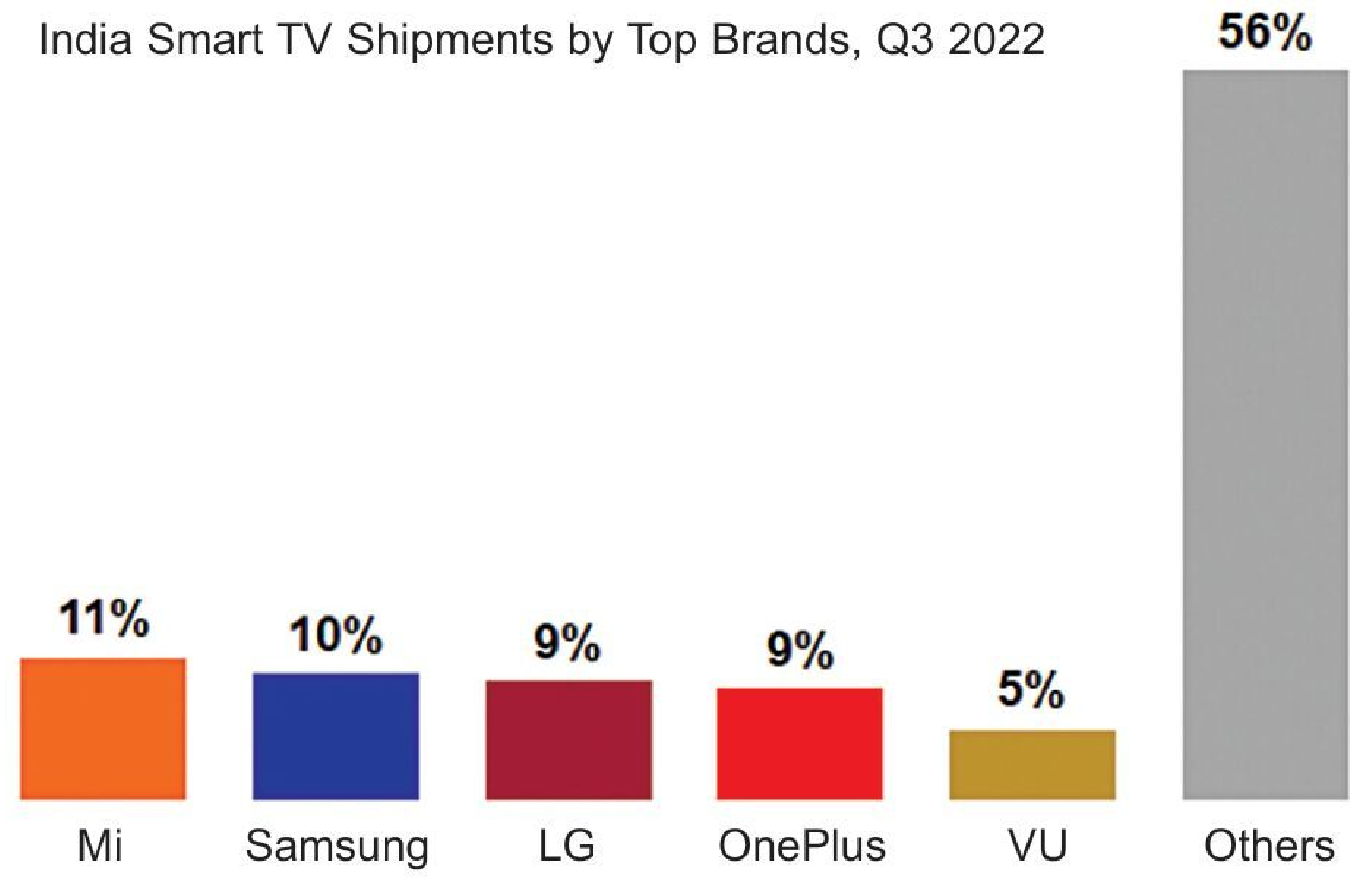
India's Smart TV Shipments See 38% YoY Growth in 3Q22

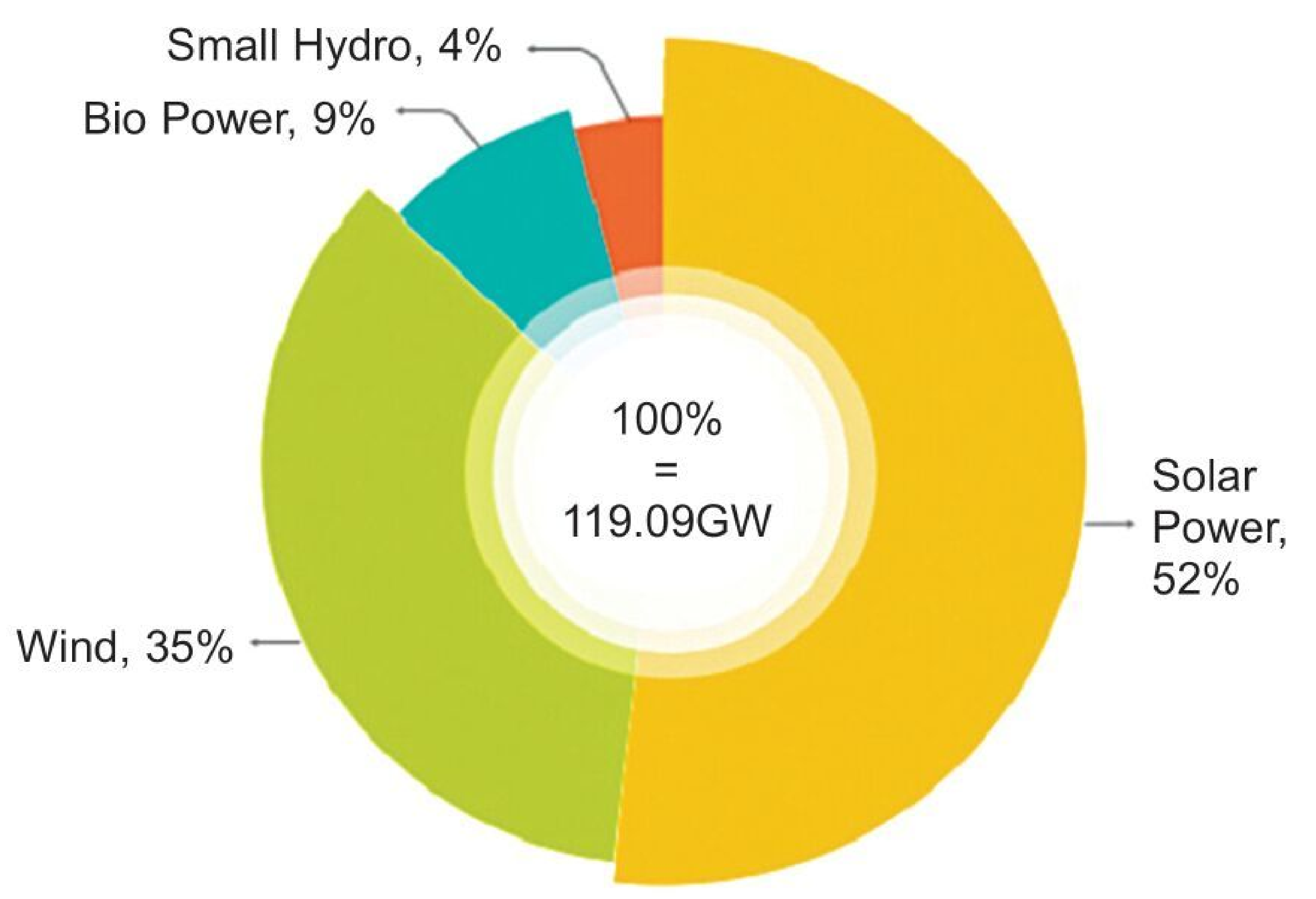
The festive season seems to have majorly driven the growth for smart TV shipments in India. The smart TV penetration in the complete market touched the highest-ever share of 93% in 3Q22. The share of smaller-size TVs is increasing, with 32"-42" displays making up almost half of the total shipments during the quarter. Online channels increased their contribution to the total shipments by 35%, offering attractive promotions, sales and discounts, along with exclusive launches in the quarter.



(Source: Counterpoint Research)

Solar Energy Source Generation Increases

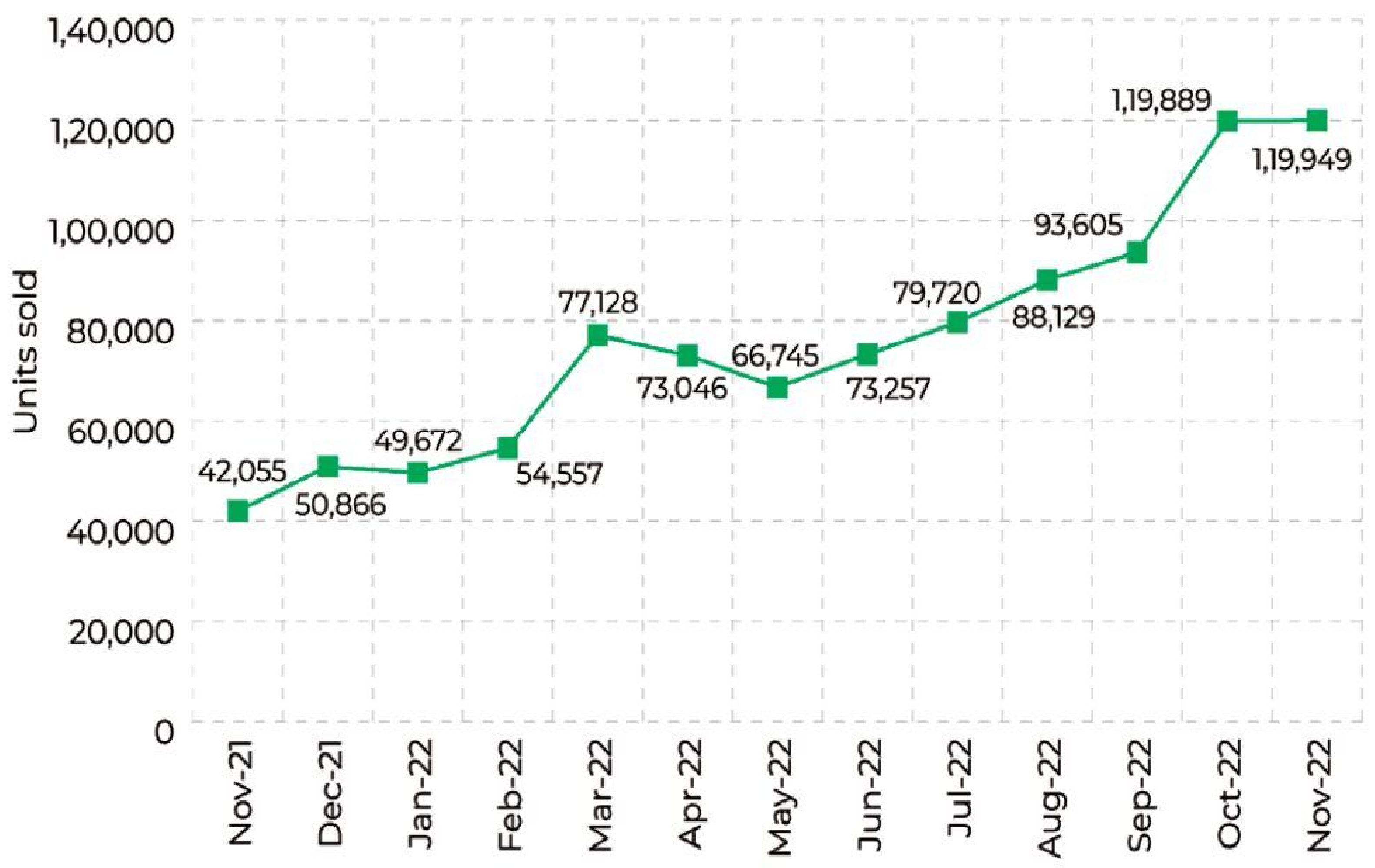
October 2022 saw 988MW of solar and wind capacity being generated as per JMK Research and Analysis. Rajasthan continues to top the list with 383MW being installed followed by Gujarat (214MW) and Uttar Pradesh (128MW). A 1.76GW of wind capacity was also added. Renewable energy sources generated 10,710 MU in November 2022, down by 12% from October 2022. Solar and wind generation decreased by 7% and 23% respectively on MoM basis in November 2022.



(Source: JMK Research)

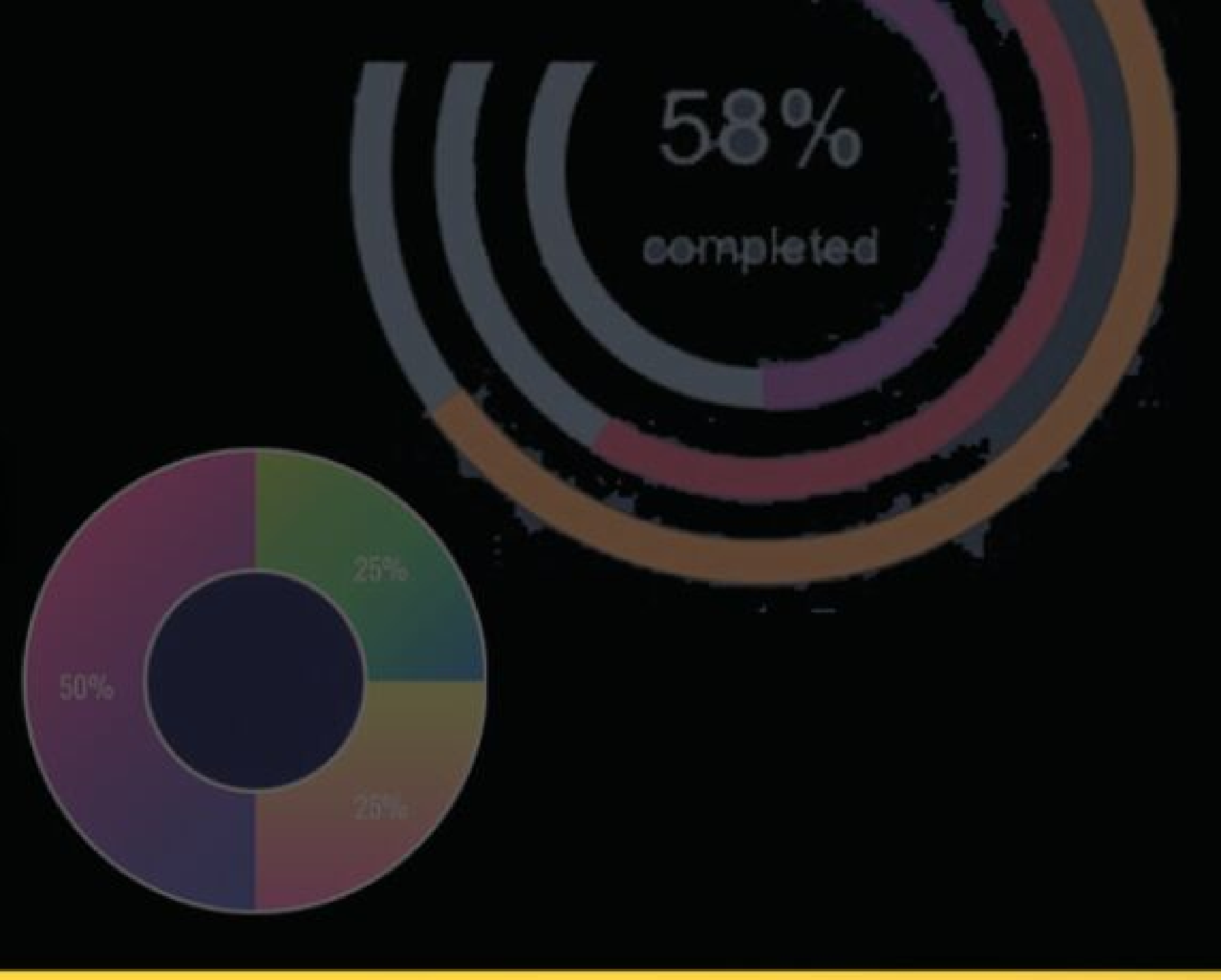
EV Sales Increase Only by 0.1% MoM

With a YoY leap of more than 185%, the overall EV sales in India for the month of November 2022 reached 119,949 units with a sale of 42,055 units in the month last year. Accounting for 93.02% E2Vs and passenger-type E3Vs are currently ruling the market. The shares of these categories were followed by e-cars (4.09%), cargo-type electric three-wheelers (2.77%), and so on. Uttar Pradesh held the highest EV registration with a rise in sales to more than 16% for the month. This was followed by Maharastra (13%); Rajasthan and Karnataka each with a 9% shared third place.



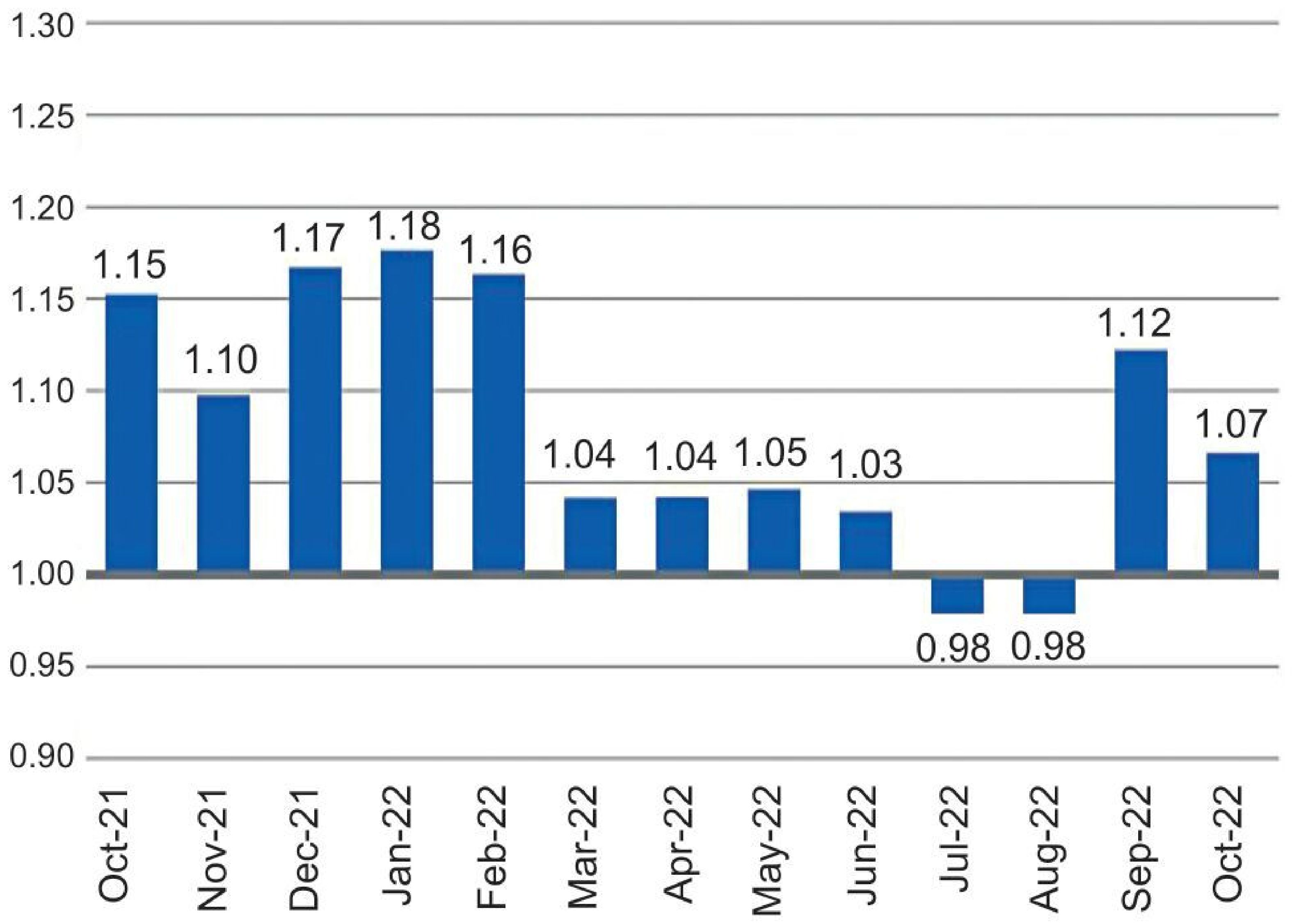
(Source: JMK Research)

At-a-glance view of key industry trends that can shape the future of your business…



Sales Up by 9% for the North American PCB Industry

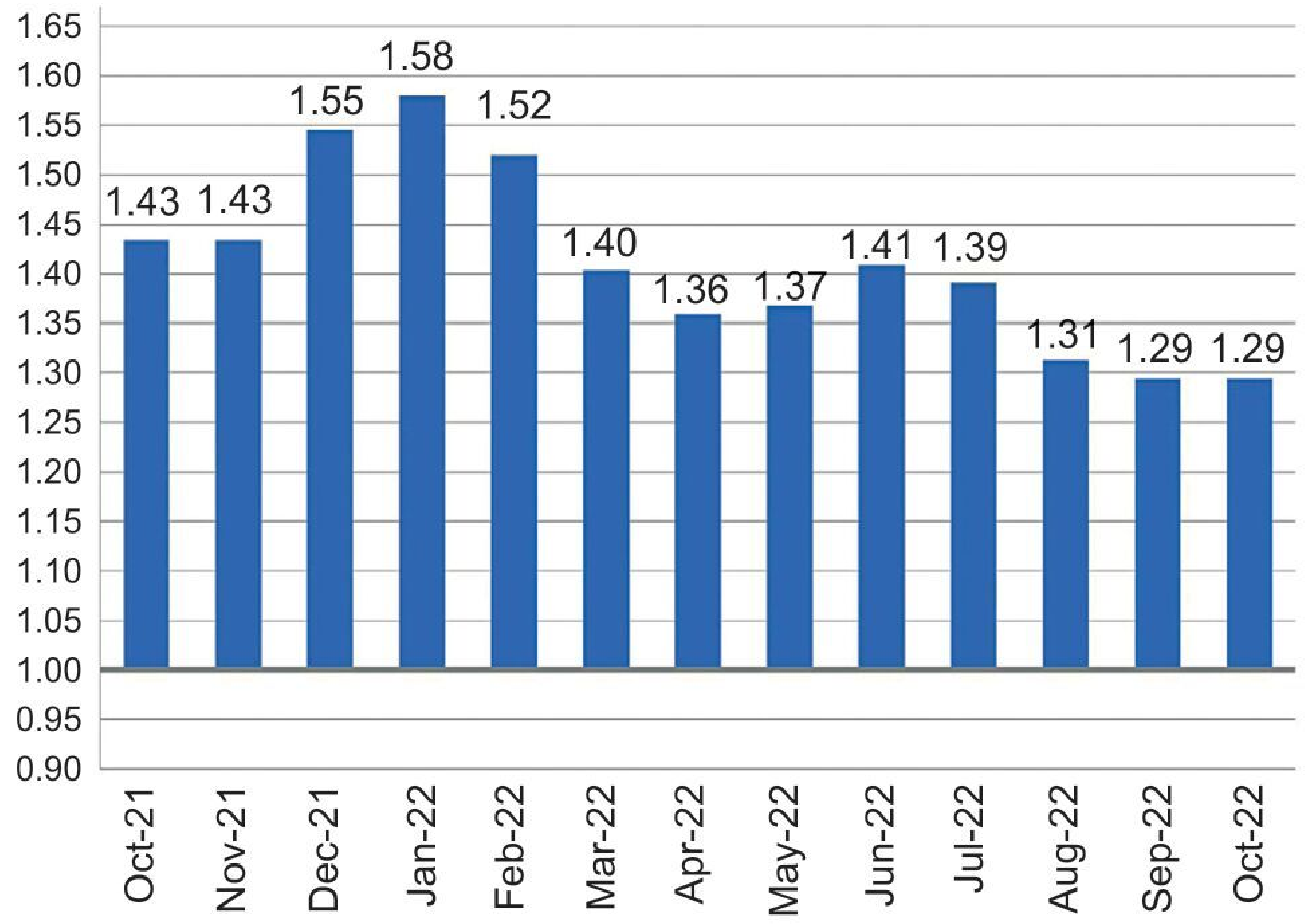
As per IPC, the North American PCB industry's book-to-bill ratio stood at 1.07 for the month of October 2022. The total PCB shipments went up by 9% as compared to last year. However, in comparison to the preceding month, the shipments in April have fallen by 13.3%.



(Source: www.ipc.org)

EMS Industry Rises in North America

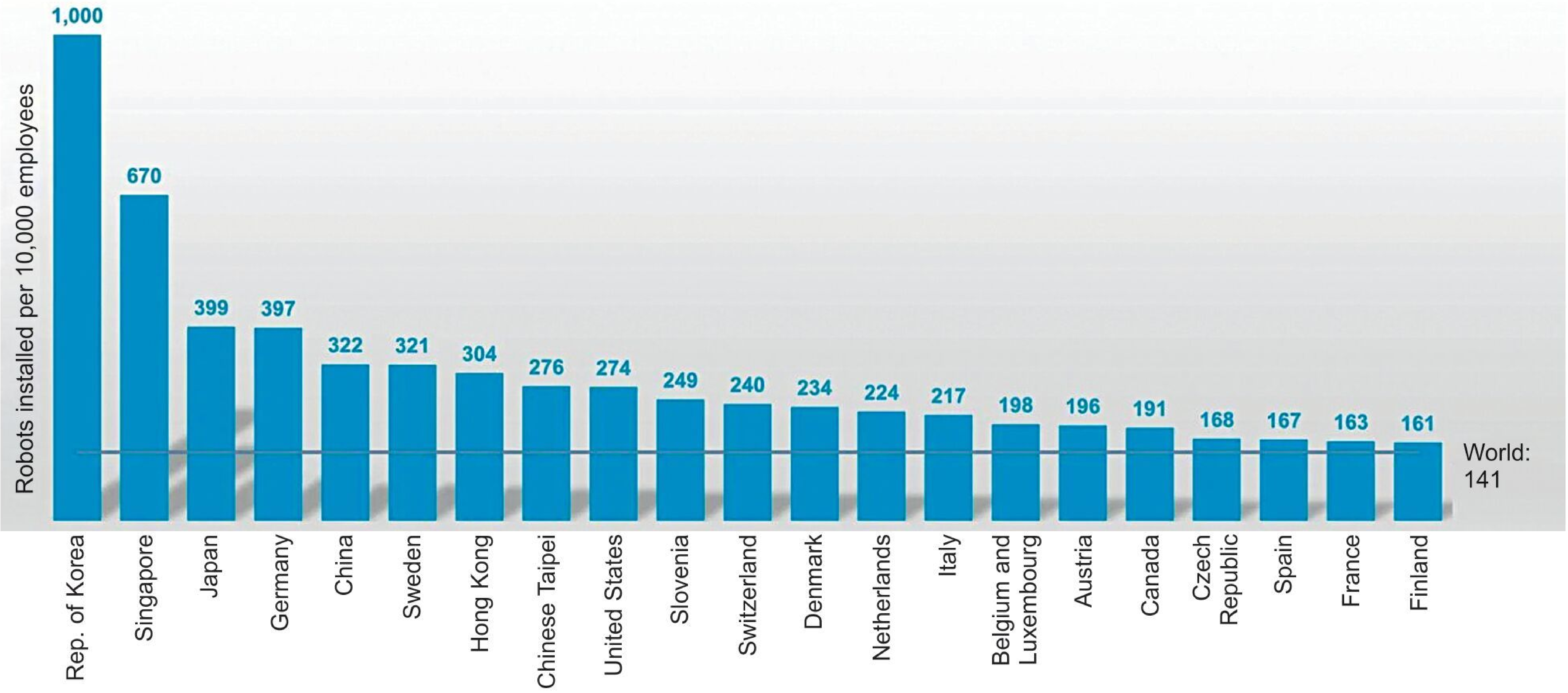
As per IPC's report, the EMS industry in North America in October 2022 showed a 14.9% YoY increase. The book-to-bill ratio stands at 1.29. However, the total EMS shipments decreased by 2% while EMS bookings increased 7.8% YoY and decreased 1.5% from the previous month. IPC's monthly EMS industry statistics are based on data provided by a representative sample of assembly equipment manufacturers selling in the USA and Canada.



(Source: https://www.wnie.online)

Korea Tops in Terms of Robot Density While China Surpasses the US

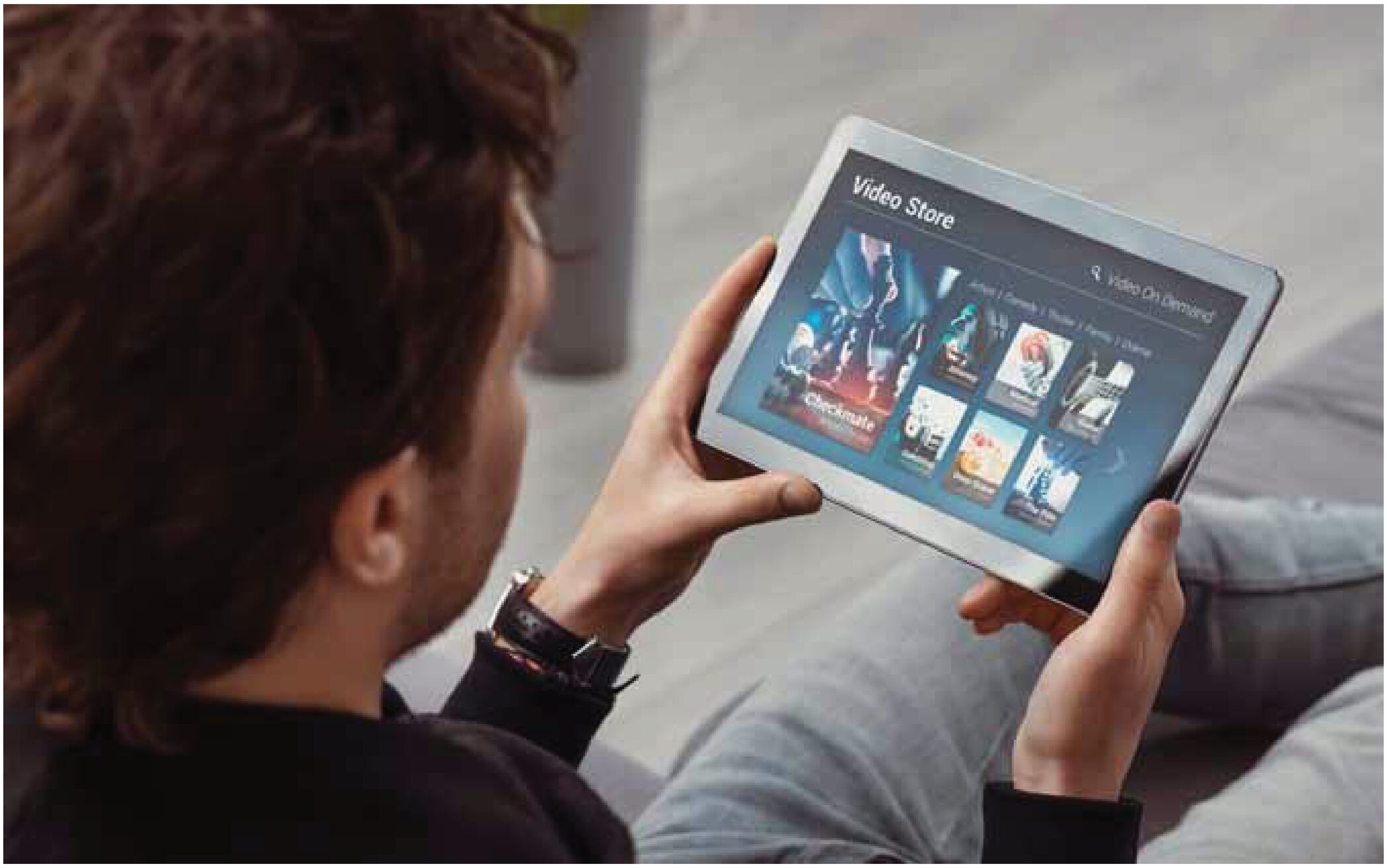
As per reports, South Korea has reached an all-time high of 1,000 industrial robots per 10,000 employees. China's industrial robotics market witnessed 243,300 installations in 2021, a 44% increase YoY. China outstripped Taiwan, the US, Hong Kong and Sweden in robot density. South Korea, Singapore, Japan and Germany continue to remain in the top four spots globally. It is noted that as the top manufacturer of industrial robots, Japan stood third with 399 robots for every 10,000 workers. Japan manufactures 45% of the global supply of industrial robots.



(Source: https://ifr.org)

DEVELOPING LOVABLE PRODUCTS
To Win Over Competition

This article and the forthcoming in the series will explain what makes a product lovable and how to consistently create such products for brand building to win over any competition in the market



SOUMYANATH CHATTERJEE is former TVS Motors Chair Professor at Industrial and Systems Engineering Department, IIT Kharagpur. His expertise are in Product Development and Supply Chain Management

Right from waking up to the time we go back to sleep we continuously use some product or the other. Even during sleep, we use products like the bed, pillows, fans, alarm clocks, etc. But we love some of these and hate a few. We willingly pay a premium price for the products we love. We take good care of them and go back to the same manufacturer for replacement. Over the years, manufacturers of those lovable products develop strong brands. Brands that most people trust.

There is quite a varied choice when it comes to the loved products. Some people may love their musical instruments, some their bike, and some their mobile phone. And one person can love several products, some of which the person may not even have.

People often make many personal sacrifices to acquire these loved products. Costly goods like cars, bikes, and watches fall in that category. When we plan to

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develop a product, we should try to make it lovable. Lovable products create their own market and help to create a strong brand.

Let me explain what is a lovable product with a few examples from my personal use. The first product that I would describe is my pen. I received it as a gift from my father. It is a fountain pen made by a reputed company. It enables smooth writing and holds sufficient ink so that I never have to worry about the ink running out. Its grip is comfortable. It also looks nice with a silver cap on a black body and a gold-plated clip.

I used to carry it in my pocket more as a fashion accessory. I have used it since my student days and wrote all my major examinations with it. Now getting ink for the pen is rather difficult, so I have replaced it with a roller pen of the same brand.

The second loved product I have is my old calculator. This one is a small scientific calculator. I do not need it now. There are software solutions on my phone and my computer, but I still keep it as a memento.

I have used it throughout my student period and a good portion of my work life. The battery of that calculator lasts more than a year of constant use. It had taken a fair amount of abuse in terms of fall and water damage but has survived all those with some minor dents and scratches. Its size is small enough to carry in a pocket.

I can go on with the list of more products that I love but let us pause to understand what makes these products lovable. The common thread between these products is frequent usage, their robustness, and good user experience. Together they create habit-forming products—the products in which we find comfort and cannot live without.

The habit-forming curve in Fig. 1 tells us that we get habituated to the products that we frequently use. Until the frequency of use crosses a threshold limit, we will not get attached to that product. Similarly, we need to find some utility of the product. Unless we have some perceived utility for it, we do not get attached to the product.

The combined factor of perceived utility and frequency of use gives rise to habit formation. In our daily use we have multiple alternatives. We have to think and choose between these alternatives. All these choices require certain mental activity. When we convert these mental efforts into a habit we do not have to think.

Habits make it possible for us to deal with complexities in life without wasting our mental energy in performing the task. It is like learning to ride a bicycle or drive a car. As long as we have not mastered the controls, we need to think. After practice, these activities become a habit and one can do these activities without much effort.

It is the same with our selection of products. For a successful product, we need to increase its frequency of use as well as increase its perceived utility.

Products have two different kinds of utility. The first addresses some specific problems that we have. According to Nir Eyal, author of the bestseller 'Hooked: How to Build Habit-Forming Products,' such utilities are like painkillers. We do not use these painkillers unless we have pain. They have a high perceived utility but fall short in the frequency of use.

The other kind of products he calls vitamins. We use these products regularly to ward off some notional problems. A pharmacist will tell you that vitamins sell more than painkillers.

Coming back to my examples of calculators and pens, I used to carry them in my pocket or my bag more as security. Now the calculator has been replaced by a mobile phone. A mobile phone has more utility and takes about the same amount of space.

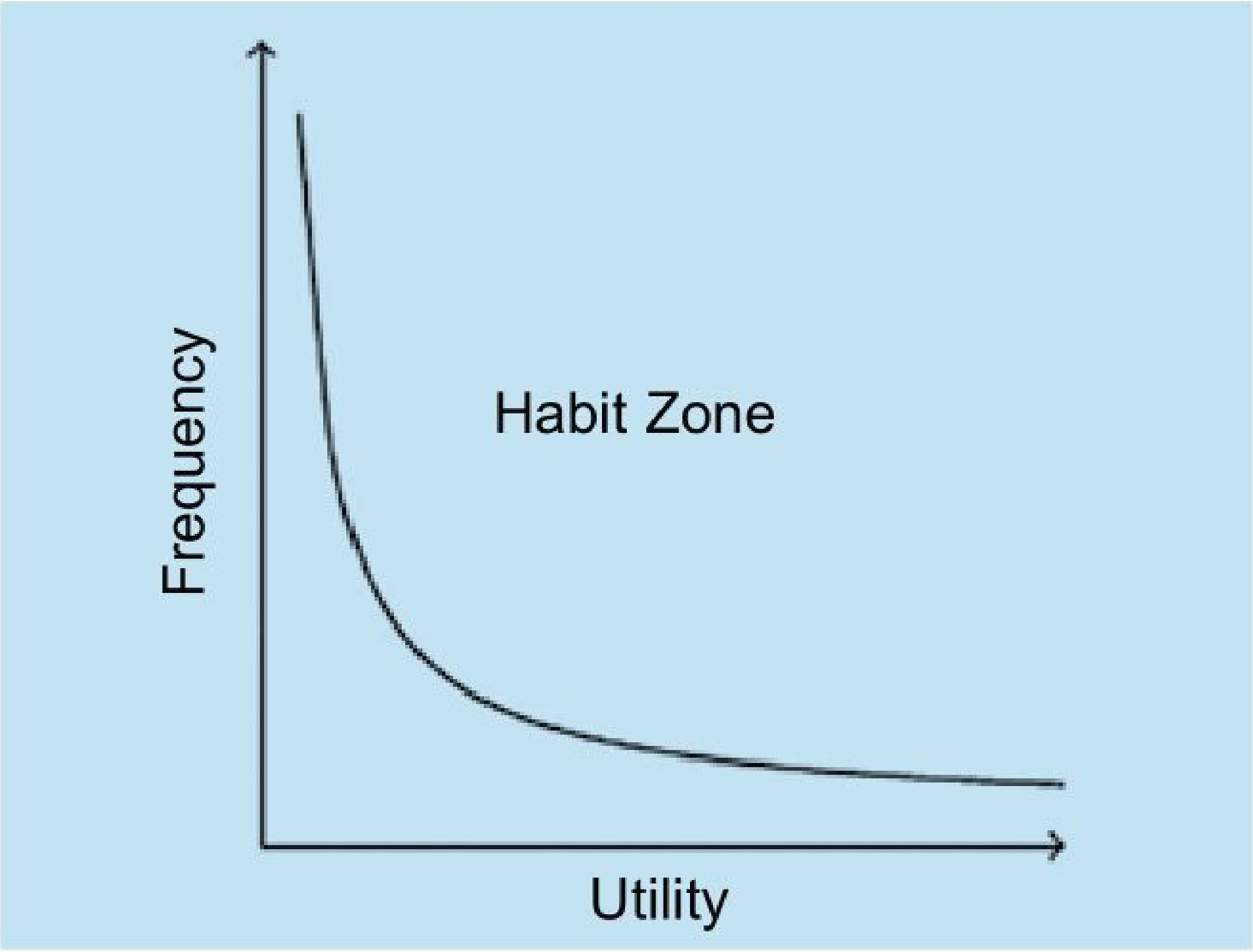

Fig. 1: Habit formation

There are many more things in my house that have occasional use, but I do not carry them around all the time as I do my phone and the pen. The reason I carry my phone and pen is that I can afford to. The property that makes the product to be used in a certain way is called *affordance*. This is the property that makes us use the product in intended or unintended ways.

For instance, the designer of the pen provided a clip for us to attach it to something—be it a shirt pocket or a loop inside my bag. Now, I also use the clip to secure some loose paper on my desk. This is an affordance that probably the designer had not planned. Sometimes I may stretch the unplanned affordance and clip a whole bunch of papers.

A well-designed product will either prevent such unplanned use or accommodate it. For instance, the clip of a cheap pen will bend and become loose after I clip a thick bunch of papers. In my pen, the clip is designed with variable rigidity that will not allow me to insert more than a couple of sheets, and the clip will withstand only that much abuse.

A well-designed product will have a good amount of affordance for its intended use. For instance,

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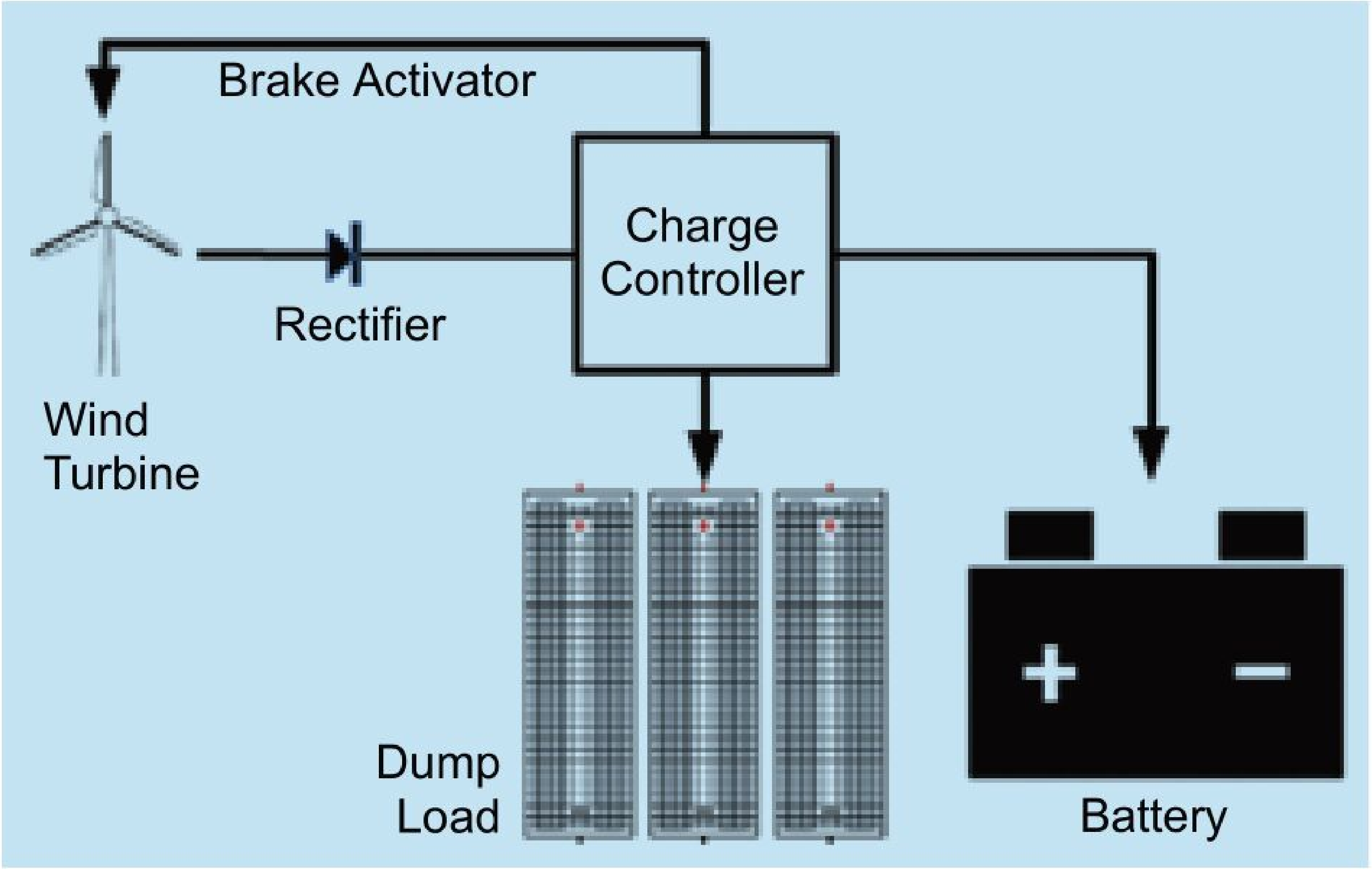

Fig. 2: Windmill charge controller with dummy load

the pen is lightweight so I can carry it or write with it easily. It has a nice grip that is comfortable to hold for hours. It writes smoothly. The cap is easy to open but at the same time remains secure once closed. The clip, which is visible from my pocket, is aesthetically designed and acts as a fashion accessory.

The ability to use a product in different ways increases its utility and makes us use them frequently. Which in turn makes them more adorable. Now, the product does not become useful by the mere presence of the affordance. The user of the product must know about its presence and get a hint on how to use the affordance.

The feature that communicates affordance to the user is called a *signifier*. For instance, in my pen, there is a ring between the body and the cap. This is a signifier that separates two similar-looking objects so that I know which two parts to hold and pull to open the cap. Affordances are the physical features that enable us to use the product; signifiers are the communication features of the affordances that tell us about the presence of the feature and give hint on how to use the affordances.

Proper design of signifiers differentiates great products from the rest. Improper signifiers, on the other hand, create difficulty in using the product and reduce its value. For instance, when we see a door recessed inside a frame, the signifier invites us to push it open. If the door opens outside, or we need to pull it sideways, then that needs to have a certain signifier telling us that. A bar on the door signifies pushing and a handle invites us to pull it. A pedal gives a clear indication of pressing it with the foot.

It is not uncommon to find improper use of signifiers. When you see a door with a bar your instinct will be to push it. But if you have to pull it to open you get into a behavioural conflict. Faced with a conflict of the signifiers, our first reaction will be confusion. If we have to use such features frequently then instead of loving we shall develop a hatred for the product.

We are all too familiar with the elaborate ornamentation around the entrances of a building. The ornamentations help to separate the gate from the fence, or the door from the wall. While doors and gates are the affordances, ornamentation that is around the door or gate is the signifier. Just like the ornamentation and design of the doors and gates give us an indication of the ambiance and quality of what is inside the house, the signifiers in the product give us an indication of the product.

Aesthetics and quality of interface play a very important role to make a product successful. Before we discuss product design let us first discuss the concept of a product.

A product is meant to achieve certain results. The product can be a physical thing or it can be a software. Television, computer, mobile phone, fridge, and cars are examples of physical products. Operating systems, computer games, and mobile applications are examples of software products.

We use a product to achieve something. This results in the utility of the product. We value the product because of the utility that it has. Now, there are certain costs that we have to incur to use the product. These costs are in the form of money, energy, time, and attention that we have to spend to get our desired result. We like the product that gives more utility using less cost.

A lovable product has to provide more utility at a lesser cost, which gives us the perceived utility. It also needs to get used frequently to be in the habit-forming zone. Such a combination needs careful planning and careful trade-offs between various alternatives. Swiss knife or combination tools are one of the best examples of clever design to increase the frequency of use.

In my desk's drawer, I have a supply of scissors, a knife, a magnifying glass, and other such tit-bit tools. There is also a Swiss knife that has all the functions. It is no surprise that most of the time I will grab the Swiss knife for anything. As it is frequently used, it is kept in the most accessible part of my drawer. I can grab the Swiss knife even without looking at it. Any of the other tools will require a search inside my drawer.

If you look at a catalogue of Swiss knives, you will find there are plenty of different varieties of the knife. Within the knife the blades and implements provided in different knives are carefully planned. For instance, the one I have is meant for an urban office and has a reading glass, a few screwdrivers, a knife, a can opener, and other things.

I have another version of the knife, which is meant for camping. That one comes with a tiny saw, a file, and a hook, which are missing from the office version. Each of these has the appropriate set of tools

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for its place of use. Good product design needs to carefully evaluate what features to provide in the product to make it most useful.

Let us take designing of windmill charge controller system as an example to understand the concept. I have selected this example on purpose. First of all, the device is rather simple, which will allow us to concentrate on the design process rather than getting involved with electronic circuits. The second reason for selecting the charge controller is that it will be functioning somewhere in obscurity and forgotten. We shall try to change that and explore ways to make the charge controller a lovable item.

Wind turbines are mechanical systems. If we simply disconnect the battery, once it is fully charged, the turbine will start rotating rapidly in absence of any load. Such rapid rotation may lead to turbine failure. When the turbine produces more power than required, the extra power needs to be diverted to auxiliary equipment like some pump or decorative lighting, etc. The charge controller does this work.

The windmill charge controller has multiple roles to play. It prevents overcharging of the battery, ensures that charge does not flow back from the battery to the turbine, and it also needs to protect the turbine from rotating too rapidly. Windmills generate alternating current, which is rectified before use.

Charge controller sits in between the rectifier and battery. A dummy load is attached to the charge controller (see Fig. 2). In case the turbine starts rotating too rapidly, the charge controller activates a braking switch to slow down the rotation.

In this basic configuration, customers do not interact with the charge controller directly. Such an item will be treated as an appendage of the windmill and treated as a commodity item. Such a product will have multiple competitors. Each of them will try to compete on cost and reliability.

Unless you produce the controllers in huge quantity it is very difficult to compete on these two parameters alone. There is no way you, as a designer, can make such a product stand out from the others in competition.

The charge controller performs some useful functions but it falls short on the frequency of use. Our innovation to make the charge controller a lovable product has to be directed towards increasing the frequency of use.

The basic function of charging a battery or diverting the power to a dummy load does not have any user interaction. We need to think of adding additional functions to the charge controller to do that. If we consider that the essential function of a charge controller is to protect the battery then adding battery status monitoring is something that we can provide easily.

Other parameters that the charge controller monitors is the power generated and power consumed. Keeping track of these parameters can add value to the homeowner. If the user knows the power generation and consumption patterns then he or she can plan the load distribution more intelligently. These parameters can also tell us about the battery condition and warn us of any deterioration of battery capacity.

It is easy to see that a smart charge controller that gives us all this information will bring a product from obscurity to the centre of attention. We have various alternatives for making the charge controller share this information. This information can be stored internally and analysed using an onboard computer. Another alternative can be storing this information in a cloud server where the analysis can be done. Third option may be to store the information only and transfer the data into a portable memory card, which in turn can be analysed on a desktop or laptop computer.

Each of these options will have different design and cost implications. Product performance and technical features like power requirements, voltage, and current are important as the controller must operate in conjunction with readily available products being sold in the market.

While deciding on the final product specifications we need to look at the market competition, the features being offered by other manufacturers as well as their prices. After all, a lovable product will also need to be affordable. For developing the product we need to consider many other factors like the environment it will operate in, various governmental and other regulations, besides making provisions for the future requirements that may arise.

When we start to define a product, we shall have many options and shall decide on certain options. At the product definition stage, these decisions do not cost much effort or money but these have far-reaching consequences.

A study done on cost commitment at various stages of design found that about 63% of product cost gets frozen by the end of conceptual design. By the time a product design is made more than 80% of the product cost is committed. Improvements and innovation done in the subsequent stages are only limited to the remaining 20% of the cost.

Hence, a lot of care should be taken in deciding the correct product specifications and the correct design options. These analyses lay the foundation for the rest of the product development process. In our next article, we shall discuss the process of arriving at the product specification systematically. EFY

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"Our CENTRE IN INDIA Will Be An EXTENSION Of Digi-Key Inc"

Digi-Key Electronics, one of the giants in the distribution of electronics components, recently opened a distribution centre in Bengaluru. Yashasvini Razdan from Electronics For You had a free-wheeling discussion with Ramesh Babu, Chief Information Officer, Digi-Key, and got to know about the plans for this centre. Here are the key excerpts

Digi-Key
ELECTRONICS

RAMESH BABU
CHIEF INFORMATION OFFICER, DIGI-KEY ELECTRONICS

Digi-Key had been planning a setup in India for quite some time, but some legal issues were acting as a deterrent. What has changed for you to take the leap now?

Digi-Key has been in India for a long time, irrespective of whether we physically had a building or not. This year alone, we directly sold around $70 million worth of products from India through the US website. We do have offices (already) in India. For example, in Delhi and Gurgaon we have an order entry support team. So, I see the new centre as an extension of what we already have.

What are the key drivers that prompted Digi-Key to set up a larger presence in India?

First, our sales have grown in India (even) with limited marketing efforts at our end. We had been thinking about how to support the growth, and it reached a point where we needed to have a local presence. We have also seen a shift in our supply chain. Some of our product suppliers are shifting their manufacturing from China to India. The most famous example is that of Apple shifting some of their production to India. There is a whole ecosystem around Apple and other electronics players where they are covering customers. So, we are looking at a very explosive growth and we cannot afford not to have boots on the ground to support as well as fuel the growth and have the infrastructure available readily to support our current customer growth. So those are some of the tipping points for us—sales growth and future potential.

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Can you shed some light on the new centre that Digi-Key is setting up in India? Will it be a global support centre?

We are purposely calling it the Global Capability Centre. I hate using the word support because it's what other people use India for—that is, just support. Our centre in India will be an extension of Digi-Key Inc. We'll have sales roles, IT roles, design-engineering-support roles, and all of the supply-chain roles. Almost every role you can imagine will be there. So, we don't think of this as a support function at all. And that is because maybe other companies do not have sales in India, but we do have sales, that too explosive sales. So, it's not without reason why we are doing it. We have customers, we source products from India, and we write code from India; so it's real. This is the best time for us to bring it all together into one global capability centre.

How will your customers benefit from your local presence and what are the prospects that we can see concerning delivery, billing in the rupee, the GST input, etc?

Yeah, I think you already are touching on it. So, sometimes, when we don't have a legal entity in India, some of the logistics become hard for our customers. So, currently, the customers are importers on record today, but by having a legal entity we will become the importers on record, remove the customs pain for our customers, and have a unified tax structure, instead of just buying in the US dollar, and be able to write whatever code we need to seamlessly on the invoices.

In addition to the sales and the logistic improvement experience angle, we are reaching out to universities in India. We are hiring university ambassadors, and we are catching engineers at the source in the engineering colleges. We are planning to provide content, such as how to do a particular design along with reference designs. We are also thinking of providing new product samples. These are the latest and greatest semiconductor designs that are coming into the market.

To fuel these designs for new products, we are reaching out to universities. The HoDs of these universities are super interested because we aren't just giving out products, we are giving them designs for the products so that students can use them to learn, and our relationship with our customers starts right there. We don't monetize the books, but they will come to know of Digi-Key and the resources we have so that when they go to the job market and start working for companies, we are a prospective destination for them. So those are some of the key advantages of being here and having boots on the ground.

Any change expected in the way you deliver products, or will it continue to happen directly from the US?

Yes, right now our delivery will continue from the US. That is more efficient because our warehouse and our logistics connection points are in the US. We are based out of Thief River Falls, a small town in Minnesota. The airport takes about ten planes of UPS and FedEx delivery boxes every day, lands in Thief River Falls and it takes minutes for them to take off a full load of Digi-Key products. Due to our exclusive nature there, we are better connected than we'd be in any big city where we'd have to compete with the IRS to get our shipments into the planes, taking us more days to ship the products. Currently, for Europe, it is two days and for Asia, it is three days. Ninety-nine per cent of the time we are able to meet those SLAs.

Can you shed some details about the legal entity of your India setup?

It's a partnership with SMC Squared that has a timeline, which is very unique. The legal entity work in India takes a long time, so we didn't want to wait for all the paperwork to be done before we could start. They call it the build-operate-transfer model; contractually it gets transferred. So as soon as SMC Squared is shoulder-to-shoulder with us, we will build the legal entity, finish the paperwork, and get all of our infrastructure in place.

Our goal is to complete the transfer within three years. Then SMC quietly drops off from the partnership while Digi-Key operates the whole facility on its own. SMC Squared has done that with other companies. So, they have a leg up in terms of teaching us how to do that. Even as simple as pulling leads to networking with all the other facilities, they've done all that for other clients. They've been an amazing partner to give us the speed and runway time as we set up our legal entity here.

With respect to India, are there any interesting trends that you can share based on web metrics? Where do we rank with respect to traffic?

In a month, globally, we get 11 million unique visitors on our website and out of that India ranks among the top ten when it comes to web traffic. So that means the traffic from India is high.

We have also discovered that the engineering population in India accesses our content a lot. A lot of them are not converted into sales, but it is really interesting. For example, on our *digikey.com* website, we have resources like calculator pages, which have engineering calculators, that allow them to perform calculations such as converting resistance into kilo-ohms. Such content is one of the most visited pages from India. It is number one in India. So that tells me that the engineering population we have in India is very education and learning oriented. They come and access the free content available almost like no other country.

How has the trend for sales been for the past two years from India?

Through the years it was explosive. I think we recorded double-digit growth in India almost every year. Obviously, the pandemic drove some of that. I don't know whether that will continue next year. Everybody is talking about a slowdown. We are seeing some slowdown but my personal take based on some of the early data is that growth in India may not go down; it may stay stable.

As I mentioned earlier, some of the manufacturing is shifting to India and that is just starting to create an ecosystem of demand for us. So, I'm hopeful it will stay, but we've witnessed huge growth in the last two years.

Since we are talking about sales, do you plan to enrol any channel partners to expand sales in India to serve many of the un-penetrated regions in India?

Honestly, the answer is no, not right now. We are channel partners for our suppliers. We have to figure out a way to penetrate every place as opposed to somebody reaching out to us. We find that engineers complain about having multiple layers of partners before they get their product. The price increases and it takes time. We have proven that we are good in both of those areas. So, our plan is to reach every nook and corner on our own. We have plans for that, and we are not planning to have another layer between us and the customer.

When will the India office be ready and functional?

Oh look! I'm sitting in the office that is already up and running. We have about 50 people in this office today. Our offices in Gurgaon and Delhi have also been up and running. It's just the paperwork, I don't know when that will complete; I can't even give you a date. I wish the government moves faster on us, but our office is ready to go.

Have you finalised any leaders to help these local operations?

Yes, we have Arun Arasu, who is our Managing Director for India. He's been in the role for about five months now. He's still learning, but he's operational.

How do you see the overall trend for e-commerce for electronics components and equipment across the globe? And then specifically with respect to India?

Almost everyone in the name of digital transformation is investing in electronics—whether it is IoT or creating digital twins in an automated warehouse, to digitise what is physically present. This is a tiny example of what we have done. We see the trend of electronification. Even during the recession, people wanted to go digital to cut costs so that they could manage the recession. We are in a good industry, where we see growth—no matter what—because of electronics.

Coming to the e-commerce question, a lot of people in the electronics industry are still very traditional. We have the manufacturers of electronic products, then people like us who are in the middle and are e-commerce distributors, and then we have the customer. Everybody wants to cut the middleman, but the unique thing about electronics is that you can go to Amazon to buy a finished product. That is why we are in the maker industry.

So, the electronics e-commerce distributors and e-commerce websites are here to stay because we give the whole bill of material to the engineers to build. We provide them with small quantities that big manufacturers cannot afford as they have a minimum order quantity, which is in millions sometimes. We sell even one part that is worth only 40 cents. We spend $20 to ship it to you, but you can still buy 40 cents worth of parts from us without any hassle. So, I think e-commerce for electronics is here to stay and we do add value for the customers, be it by giving small quantities of materials or by taking care of different countries' logistics, or providing reference design libraries.

Coming to the last part of the question, India is a broad market for us. In the UK people are curious because we always say our customers are makers, our customers are innovators, and we find a lot of them. I think our educational system is allowing engineers to be produced in mass and that is leading to be a very innovative thing as I can now see people are making products in India.

So, all these factors are helping a company such as Digi-Key to be here. It is the perfect timing for growth and innovation. I am so thrilled to see that. I feel proud to be from this country where I am literally seeing transformation in everything, not just in electronics, and that is something to be proud of. EFY

STARTUPS

& INNOVATORS

1 Testing Soil Intelligently: 100-250 Samples A Day

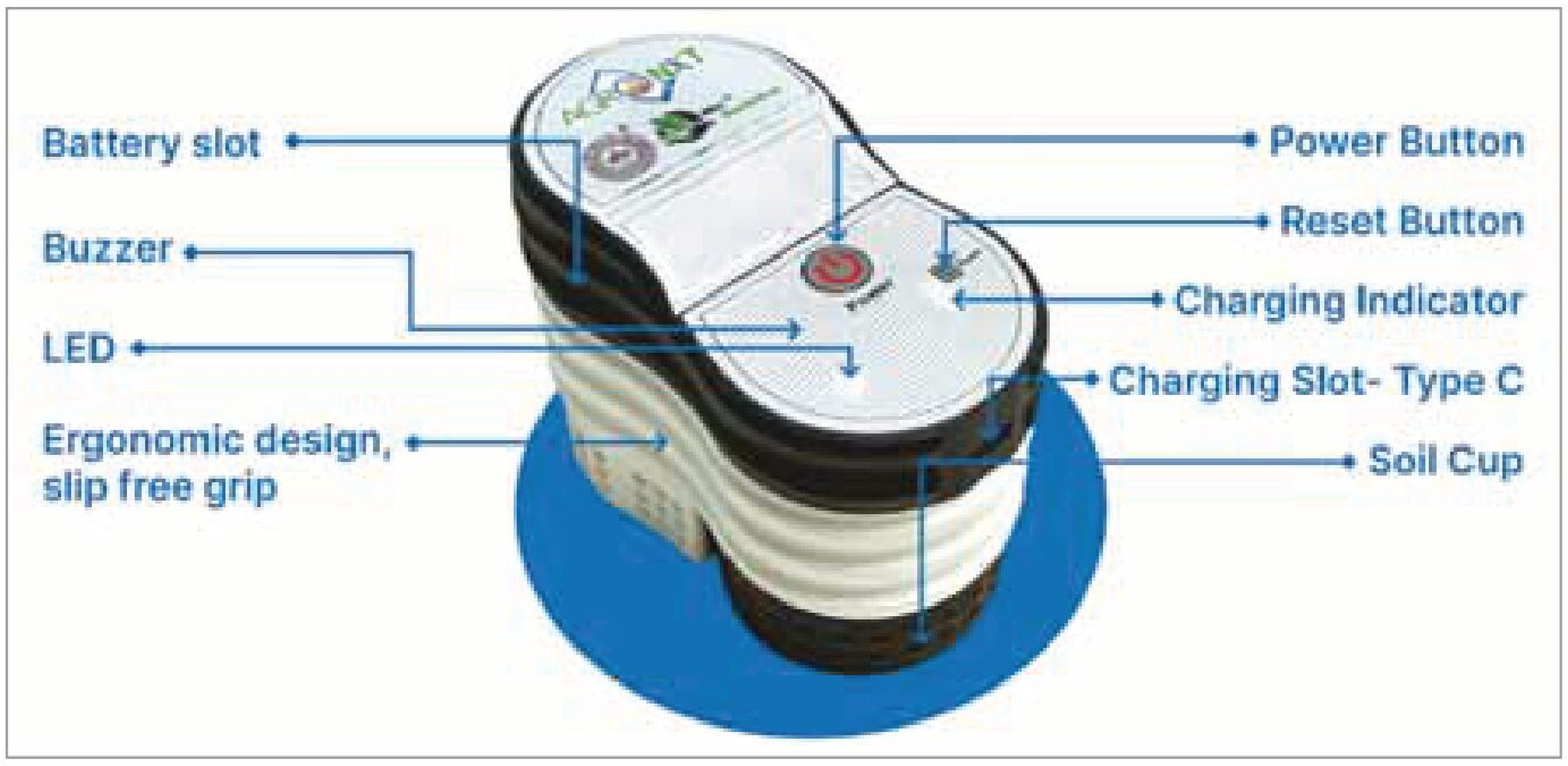
2 Matri: Mainstreaming Menstruation With Pain Relief

3 Sensor Nodes For Sustainable Future

1

TESTING SOIL INTELLIGENTLY: 100-250 SAMPLES A DAY

IIT Kanpur-incubated startup, AgroNxt, which had started out as an SaaS platform for farmers in 2016, launched a chemical-free, electronic soil-testing device, called Bhu-Parikshak, this year. It uses NIR spectroscopy and AI/ML to calculate six parameters in a soil sample instantly



Bhu-Parikshak

A typical soil testing lab in India takes as many as 7 to 30 days to test a soil sample for a farmer, according to Rajat Vardhan—the co-founder and CEO of agri-tech startup AgroNxt. But then, one probably cannot expect the 4,000-odd labs to conduct the soil tests for 140 million hectares of India's net sown area any sooner.

This is when the smart and portable soil-testing device Bhu-Parikshak (Hindi for soil tester) comes into the picture. No technical expertise is required for its usage, but just a smartphone to connect and electricity for charging it.

Vardhan and Ashutosh Tiwari started AgroNxt as an advisory platform for the farming community. With subsequent data-driven revisions and investment from IIT (Indian Institute of Technology) Kanpur as an equity holder, the team decided to introduce a solution for one of the biggest challenges faced by the farmers: the requirement for a rapid, affordable, and chemical-free soil testing device.

Interestingly, the researchers at IIT Kanpur were already working in this direction. Soon, a team under Prof. Jayant K. Singh came out with the Bhu-Parikshak. Vardhan says, "The institute chose AgroNxt to commercialise the product due to our agricultural and data expertise. They believed that an IoT based electronics solution, which would be plugged into our SaaS (software as a service) platform, could reach the farming community at a large scale."

Notably, this hardware solution is not directly intended for the farmers. Vardhan points out, "More than 80% of Indian farmers are small and marginal, who'll not be able to afford an individual device, until and unless subsidised by government."

The company is positioning the product for the industry—the 400,000 plus agri-input shops, sugar factories, coffee and tea plantations, and FMCG (fast-moving consumer goods) companies in the agriculture supply chain, who can purchase the device and provide services to the farmers. "Microentrepreneurs, self-help groups, and farmer producer organisations could also onboard and, in turn, give soil testing as a service to the farmers by charging ₹50-100 per sample, as it has to be economically viable for these groups," adds Vardhan.

To operate, Bhu-Parikshak needs

to be switched on and paired with a smartphone having the AgroNxt Bhu-Parikshak app via Bluetooth connection. Before use, the device needs to be calibrated and 5-8 grams of soil sample is poured into the designated sample cup for testing. The results are calculated and displayed in the application, which can then be shared with the farmers—all within two minutes.

Vardhan informs, “The device is based on the near-infrared spectroscopy, which is based on molecular overtones and combination vibrations that originate from the fundamental vibrational bands generally found in the mid-IR region.” It estimates the available forms of nitrogen, phosphorus, and potassium along with the clay content, cation exchange capacity, and organic carbon in the soil. The company claims that the device can test 50,000 soil samples in its lifetime, with 100-250 samples in a single day.

“As per IIT Kanpur studies, once calibrated, the device gives results with 80-96% accuracy, which is a highly acceptable figure in the soil testing market,” according to Vardhan. He adds that upon regular usage, the results keep refining because “this machine learns quickly.”

ASEAN-INDIA
START UP
Festival 2022

AgroNxt CEO Rajat Vardhan showcasing Bhu-Parikshak at ASEAN-India startup Festival 2022

When the product was transferred to the startup as a minimum viable product, they took feedback from the industry partners—which included sugar mills, agricultural input companies, FMCG companies, a few farmers, and FPOs—to ensure that it was acceptable in the market. The final hardware costs around ₹100,000, inclusive of all taxes. A nominal recurring charge of ₹10 per soil sample sustains the huge cloud infrastructure set up for this purpose.

Vardhan says that they are tying up with established players from agri-business to reach more farmers. For example, ITC is planning to work with thousands of FPOs across the country, and AgroNxt is looking forward to closely partner with the conglomerate and “support a large base of farmers in a much quicker succession.” The startup has recently tied up with various state agricultural universities to provide farmers with prompt soil testing and customised fertilizer recommendations at scale.

Interestingly, AgroNxt is looking forward to doubling its team in the next six months. “We’d like to scale Bhu-Parikshak as a global brand for soil testing and will add more features to the product from time to time,” says Vardhan. In the upcoming year, AgroNxt plans to unveil at least two more deep-tech solutions pertaining to the agriculture field (quite literally).

—*Vaishali Yadav*

2

MATRI: MAINSTREAMING MENSTRUATION WITH PAIN RELIEF

Two Bengali schoolboys used to make electronic gadgets for fun. One day in college these engineering students brainstormed about finding a solution to a common daily life problem. And they came up with Matri, a wearable electronic device to block menstrual pain—kudos, they thought about women’s problem!

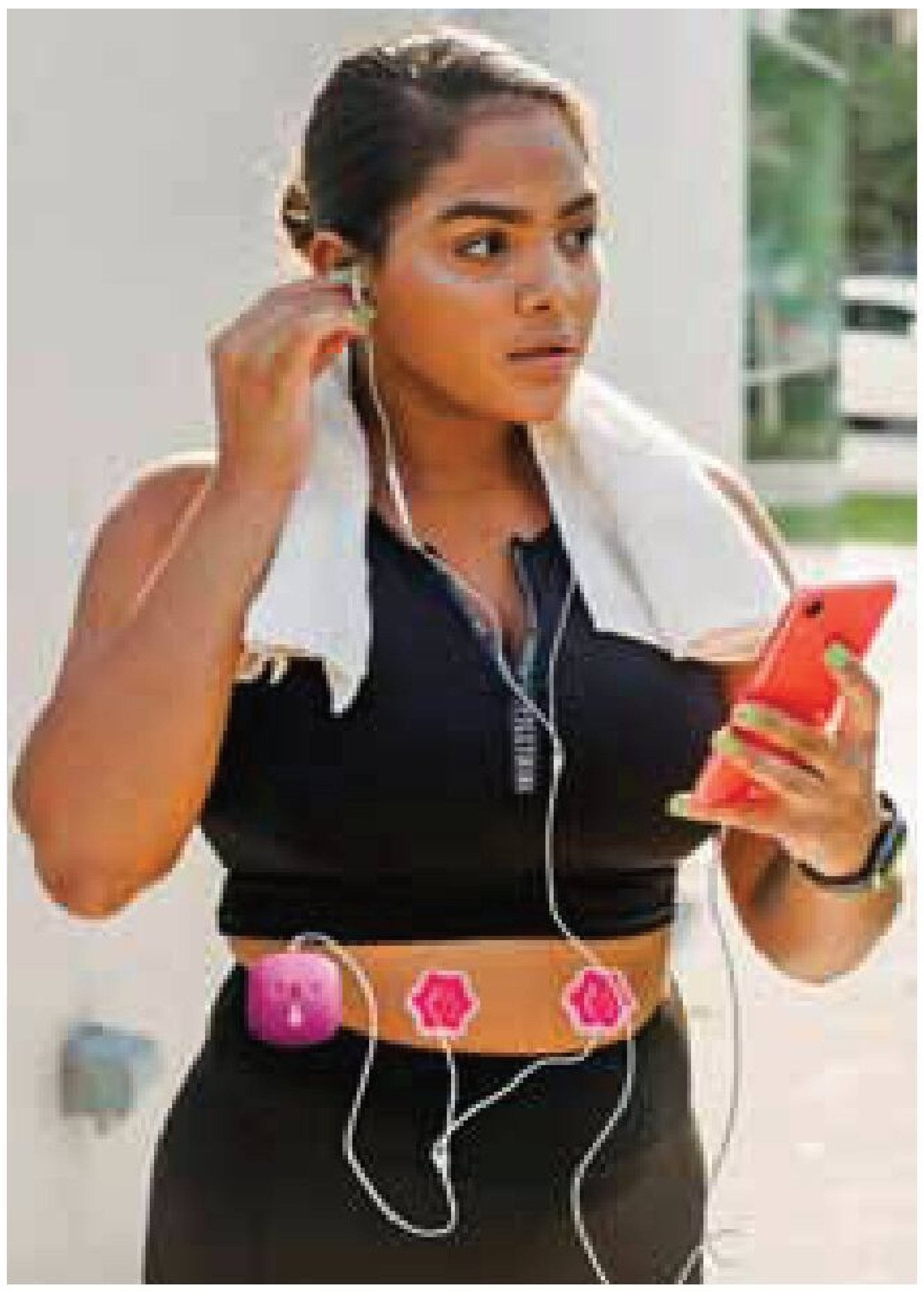
In that part of the world, where even talking about menstruation is considered dirty and shameful, two innovators from Bengal, Rohan Roy and Roni Mondal, collaborated to relieve the pain of menstruating women with their unique device—Matri. But why?

Roy says, “We see our mothers and sisters facing the same problem. There are only two conventional remedies. Hot water bags, which can’t be carried in public places, and medicines have side effects. So, we brought Matri to this big and untouched market. It is a tiny, portable, rechargeable, and wearable electronic device which is completely non-invasive in nature.”

In Bengali, *Matri* means mother. “In your tough days, it takes care just like a mother, hence the name,” remarks Mondal.

Though their startup Silifarm Technologies was registered in

Silifarm Team (L to R): Roni Mondal, CEO, Co-founder; Rohan Roy, COO, Co-founder; and Amit Dutta, CTO



A model demonstrating use of Matri

2020, the founders Roy and Mondal were working on their first, yet-to-be-launched product Matri since 2018. After improving the prototype over 12 times, it is now ready to be launched in the market in the coming months.

It is noteworthy that the startup—working with silicon at its heart—was incubated at IIT Patna, which is providing it with much-needed infrastructural and financial support. The company has tested the product with more than 400 volunteers. Mondal says, "We received 94 per cent positive feedback."

Coming to biology, it is inherent that the tissue structure and fat thickness vary in different parts of our body. In women's lower abdomen, it is quite different due to the presence of the uterus.

Roy explains, "Matri generates a particular pattern of pulse that we have designed specifically for menstrual pain. Through the strings that attach to the body, the pulse travels and penetrates the skin." It must be noted that two self-adhesive electrode gel pads stick to the lower abdomen to relieve the pain.

Mondal points out, "Pain is a signal that travels through the nerve to the brain. Matri blocks the pain pathway; thus, the pain signal doesn't reach the brain." A tucking hook is provided at the back of this device for easy wearability.

The device is expected to cost around ₹1,500, including two pairs of gel pads. The founders stress the high affordability of Matri in comparison to its competitors like Welme and Livia, thereby incentivising the common womanhood in Indian society. They claim that Matri provides relief within 10-15 minutes of usage.

Busy making the prototypes during college days, the boys faced the essential examination pressure. And after graduating, the employment pressure loomed large. But the founders believed that everything could be compromised on the path of entrepreneurship and refused to take up the college placement offer.

With no female teammates initially, they made the product on their own and tested it on their family members. After receiving the green signal, they took it to their friends and associates, who cooperated enough to give wings to their entrepreneurship.

Now, as the startup is gearing up to launch the product by March 2023, the team has onboarded an AIIMS gynaecologist as a medical mentor, an R&D engineer, and some interns.

By January end, Silifarm is expecting a good amount of funding from the Technology Development Board (TDB) under the Department of Science and Technology, government of India. It will boost its plan to move forth in the medical device sector, especially in the women's health and hygiene domain, and expand the team with skilled (not necessarily qualified) individuals.

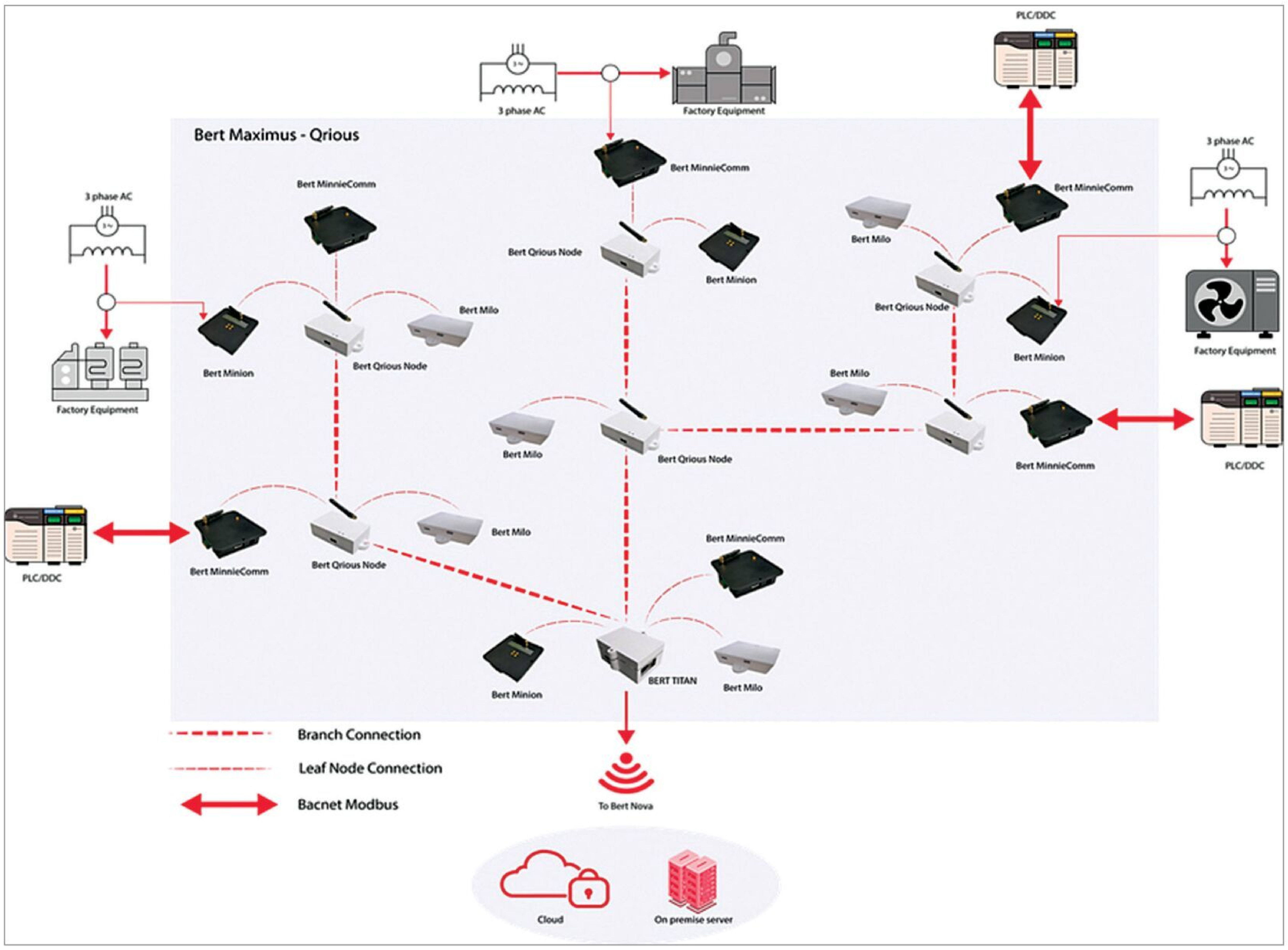
—Vaishali Yadav

3

AI POWERED SENSOR NODES FOR SUSTAINABLE FUTURE

Bert Labs is a Bengaluru based deep tech startup that is working towards sustainable energy incorporating AI powered IoT and AI to improve energy efficiency in industrial and commercial setups. The company designs and develops its sensor nodes and the whole ecosystem to sense energy consumption, compute the data, and take necessary action to save energy consumption in a building

Climate change is a major issue around the globe. And carbon emission due to energy generation and consumption of electricity heat and transport contributes most to the carbon emission. Around 18% of energy is used for powering residential and commercial buildings and the most amount of energy is utilised in heating, ventilation, and air-conditioning (HVAC), which is the single largest consumer of energy consumption in a building.


PLC/DDC
3 phase AC
Factory Equipment
Bert Maximus - Qrious
Bert MinnieComm
Bert Qrious Node
Bert Minion
Bert Milo
3 phase AC
Factory Equipment
Bert Minion
Bert Qrious Node
Bert Milo
PLC/DDC
Bert MinnieComm
Bert Qrious Node
Bert Milo
Bert MinnieComm
Bert Minion
BERT TITAN
Bert Milo
Bert Qrious Node
Bert MinnieComm
PLC/DDC
Branch Connection
Leaf Node Connection
Bacnet Modbus
To Bert Nova
Cloud
On premise server

Bert platform solution

The Bert platform solution integrates AI and IoT to monitor and control various parameters, thus enhancing energy efficiency and improving the thermal and air quality comfort in a building. With the focus on energy consumption in commercial buildings, Bert platform solution has been implemented at various companies, including a Unilever building in Mumbai. The Bert platform solution was able to achieve energy saving at that site by over 30%.

Bert platform solution is a combination of a network of modules that sense data, transmit data, analyse, and compute the data, both in real time at the edge and over the cloud. The Bert platform solution comprises Bert Maximus, which is a suite of 7 sensors that sense various parameters, such as temperature, humidity, volatile organic compounds (VOCs), CO2, occupancy, energy consumption, etc.

Bert Qrious is a patented IoT-powered wireless sensor network that is responsible for securely transmitting data. The Bert Nova is a microservices platform that manages the data while the Bert Optimus and Bert Geminus are proprietary platforms that perform real-time computation.

The current version is built on the Internet Protocol version 6, and the wireless sensor network works at 866.5MHz frequency, that is, the wireless sensor network is built on a sub-1GHz frequency. The advantage of sub-1GHz frequency is its longer range, lower power consumption, and lower interferences, which improves the wireless connectivity of the sensor node.

The company has been profitable right from its early days and predicts reaching a valuation of US$1 billion in the next four years. The company is currently focusing on the Indian market but plans to go global in the coming years.

Rohit Kochar, Founder and Executive Chairman of Bert Labs

"We are currently closing on 200 crores (two billion) on the top line. We have been profitable from day one from the first project itself to the first site deployment itself at 15%. At the PPT level, our aim is to grow at 500% year on year to be a billion US dollar revenue company in the next four years." EFY

—Sharad Bhowmick

INDUSTRY NEWS

INDUSTRY UPDATES

Electronics sector to see 10 million additional jobs being created

With the startup sector making great strides in the country, Electronics and IT Minister Ashwini Vaishnaw recently said that ten million additional jobs could be created in the following two years for the electronics and BPO sector. He was speaking at the inauguration of the national level startup initiative organised by the Software Technology Park of India and the Electronics and Computer Software Export Promotion Council in New Delhi. He elaborated that the electronics sector could alone create additional 2.5 to 3 million jobs, adding to the 8 million BPO sector jobs.

Representational image

PEOPLE (on the move)

Rowan Trollope appointed as CEO of Redis

Redis has announced that Rowan Trollope would become the company's Chief Executive Officer, replacing Ofer Bengal, who in turn will become Chairman of the Board. The transition will be effective February 1, 2023. Trollope joins Redis from Five9, Inc., where he served as CEO for over four years. He is also a recognised Silicon Valley leader with a depth of experience in software and cloud innovation.

Nayaki Nayyar becomes Securonix's New CEO

Securonix, Inc. has announced the appointment of its new Chief Executive Officer, Nayaki Nayyar, who has also become a member of its Board of Directors. Nayyar has more than 25 years of deep industry experience in accelerating innovation and growth in large enterprise software companies. While Nayyar previously held executive positions at BMC Software and SAP, she most recently served as President and Chief Product Officer of Ivanti.

Irani Srivastava Roy appointed as Signify's new chief HRO for India

Irani Srivastava Roy has been appointed as Chief Human Resources Officer, Signify for the Indian subcontinent with effect from October 2022. The company mentioned that Irani has over 23 years of experience in HR leadership, strategy consulting, and business partnering in both domestic and international markets. At Signify, she will be responsible for aligning the organisation's people strategy with business objectives, building a transformational and diverse organisation, talent development and management, and implementing HR systems and policies.

Libra welcomes Nathan Whipple as new VP of sales

Libra Industries recently announced the appointment of its new Vice President of Sales, Nathan Whipple. He has a 37 years-long business development experience in multifaceted manufacturing environments. Libra believes that Whipple is a hands-on decision-maker armed with a rich mixture of operations management and strategic sourcing experience.

Software observability provider Percepio welcomes New CEO

Sweden based Percepio AB recently announced the appointment of Adrian Leufvén as the company's new CEO. Leufvén has 25 years of experience from Enea, a publicly traded telecom software company, where he reached the position of Senior Vice President after serving in a variety of roles, including responsibility for Asia sales, product management, key account sales, R&D, quality, and business unit operating systems.

Calendar of Forthcoming Electronics Fairs/Exhibitions/Seminars/Events

Event, Date and Venue	Topics	Contact address for details
CES 2023 January 5-8, 2023 Las Vegas, USA	CES is a trade-only event for individuals 18 years of age or above and affiliated with the consumer technology industry. CES is the most influential tech event in the world—the proving ground for breakthrough technologies and global innovators.	Website: https://www.ces.tech
VLSID 2023 January 8-12, 2023 Convention Center, HICC Hyderabad	International VLSI Design & Embedded Systems conference is a premier global conference with legacy of over three and half decades. This global annual conference focusses on latest advancements in VLSI and embedded systems.	Website: https://vlsid.org
NEPCON JAPAN 2023 January 25-27, 2023 Tokyo Big Sight, Japan	Launched more than 30 years ago, it has six shows for electronics manufacturing and R&D.	Website: https://www.nepconjapan.jp/tokyo/en-gb.html
Embedded World March 14-16, 2023 Nuremberg, Germany	The Embedded World exhibition and conference provides a global platform and insight into the world of embedded systems, from components and modules to operating systems, hardware and software design, M2M communication, services, and various issues related to complex system design.	Website: https://www.embedded-world.de/en
Electronics For You Tech Expo March 24-25, 2023	Pune is one of India's fastest growing electronics and automotive regions. The Pune-Nasik-Mumbai triangle represents a market that's not been tapped by any major electronics event yet. Hence, Electronics For You team is taking the initiative to launch EFY Expo @ Pune. The expo is powered by MOVES—a unique conference targeting mobility, automotive, and EV sectors.	Website: https://www.electronicsforu.com/events/electronics-for-you-tech-expo

Since this information is subject to change, all those interested are advised to ascertain the details from the organisers before making any commitment.

MoS inaugurates Centre for Skill Development in RF and microwave

The Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship Rajeev Chandrasekhar marked his virtual presence at the recently held first edition of the IEEE MAPCON (Microwave, Antennas, and Propagation Conference) 2022 event in Bengaluru. The minister inaugurated the IEEE-Ansys Centre for Skill Development in Radio Frequency (RF) and Microwave and Ansys Innovation Space (AIS) Portal at Reva University in Bengaluru. The Centre will help skill the workforce in the electronics, semiconductors, and A&D (aerospace and defence) sectors.

Metaverse BLR Metaport launched for Bengaluru's T2 airport terminal

Bangalore International Airport Ltd (BIAL), the operator of Kempegowda International Airport in Bengaluru, recently announced the launch of the first phase of BLR Metaport. With this new launch, BLR Airport's T2 becomes one of the first terminals in the world that can be experienced on the metaverse. Designed in collaboration with Amazon Web Services (AWS) and Polygon, the BLR Metaport has been built to deliver an enhanced and immersive digital experience for the travellers.

India assumes Chair of global partnership on AI Summit in Tokyo

At the recent Global Partnership on Artificial Intelligence (GPAI) Summit held in Tokyo, India took over as the Chair of this global partnership. GPAI is an international initiative to support responsible and human-centric development and use of artificial intelligence. The event was attended by the Minister of State (MoS) for Electronics & Information Technology and Skill Development & Entrepreneurship Rajeev Chandrasekhar virtually. He represented the country and took over the Chair from France, which is the outgoing Council Chair.

Interestingly, India is also heading towards the presidency of G20, a league of the world's largest economies, in December.

Next decades are going to be partnership driven: MoS Chandrasekhar

The Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship Rajeev Chandrasekhar recently attended the India Global Forum in Dubai, UAE. There he met the senior leadership of organisations such as Sequoia, Coinbase, and VerSe. The minister also participated in the Ministerial Roundtable titled Globalisation of Indian Tech & Innovation Talent as a part of his visit to the IGF2022.

MoS inaugurates Digital India Startup Hub at STPI-Davanagere

The Software Technology Parks of India (STPI) centre at Davanagere, Karnataka has been inaugurated by Rajeev Chandrasekhar, the Minister of State for Electronics & Information Technology and Skill Development & Entrepreneurship. The state government has provided approx. 1,000 square metre built-up space in Karnataka State Open University (KSOU) Regional Centre, Davanagere for the establishment of this STPI Centre. It has a plug-n-play 102-seater Incubation facility, Network Operations Centre (NOC), 16-seater conference room, a cafeteria, and provision for providing high-speed data communication facilities and other services required for export of software and services.

ESDM-hub in the making: EPIC partners with Odisha

Hardware products think tank EPIC Foundation recently signed an MoU with the Odisha government to design and manufacture world-class electronic products within the state. As per the agreement, the foundation will work towards accelerating the growth of the electronics and semiconductor ecosystem in the state with the aim to transform Odisha into a hub for electronics system design & manufacturing (ESDM) in the long run.

Samsung India on a major recruitment spree

Samsung India has officially announced the recruitment of newly hired engineers who will be working in the Samsung R&D institutes in Bengaluru, Noida, and Delhi, and in the Samsung Semiconductor India Research in Bengaluru. Close to 1,000 engineers would be hired and will work on new-age technologies. Of these, 200 engineers would be hired from IITs such as IIT Madras, IIT Delhi, IIT Hyderabad, IIT Bombay, IIT Roorkee, IIT Kharagpur, IIT Kanpur, IIT Guwahati, and IIT BHU, among others. Besides, 400 pre-placement offers (PPOs) are also available to students at the IITs and other top institutions.

SNIPPETS

- Fujitsu and SettleMint recently signed a global strategic agreement to accelerate the digital transformation of the Fujitsu Enterprise Blockchain and Track and Trust Solutions.
- element14 recently announced the signing of a new global distribution agreement with Analog Devices, Inc.
- A leading inspection equipment developer and supplier, Pemtron Technology, recently announced that the company went public on the Korea Stock Exchange last week.
- EDOM Technology has signed an agreement with Eggtronic to extend the latter's coverage of the Asia-Pacific region. The agreement specified that the distributor will stock Eggtronic technologies and provide local support to customers in Greater China, India, Japan, Korea, and some other South-East Asian countries.
- STMicroelectronics and Soitec recently announced the next stage of their cooperation on silicon carbide (SiC) substrates.
- DK Corporation recently joined the RE100 international initiative while renewing its initiative to power all its facilities with renewable energy by 2050.
- Tech Mahindra has signed an MoU with a Thailand government's Digital Economy Promotion Agency to accelerate digital transformation in the South-East Asian nation.
- Cypherock recently secured $1 million from technology industry leaders and plans to utilise the newly-raised funds to build a hardware wallet without a seed phrase.

Tata Group to begin semiconductor production in the country

Tata Sons Chairman Natarajan Chandrasekaran has revealed that the conglomerate plans to launch some new businesses very soon. Making India a key part of global chip supply chains, India's Tata Group is soon to begin production of semiconductors and has already announced a semiconductor design and development partnership with Renesas Electronics in June. Tata Group plans to invest $90 billion over the next five years.

Airtel and Mahindra to set up 5G-enabled auto unit near Pune

Bharti Airtel recently announced that it has strategically partnered with Tech Mahindra to deploy the '5G for Enterprise' solution at Mahindra's Chakan manufacturing facility near Pune, making it India's first 5G-enabled auto manufacturing unit. The partners believe that Airtel's integrated connectivity portfolio of '5G for Business' along with Tech Mahindra's industry knowledge will benefit enterprise customers and accelerate the adoption of transformative network technologies like 5G in India.

Tech Mahindra and Axiata to introduce innovative 5G enterprise solutions

Tech Mahindra and Axiata Group Berhad have signed an MoU to co-develop and market innovative 5G enterprise solutions across Malaysia, Sri Lanka, Bangladesh, Nepal, and Cambodia. The official release noted that the two companies aim to accelerate the expansion of innovative new-age and cost-effective 5G solutions across industries, including manufacturing, oil and gas, and smart cities and services.

e^pump
15 Min Rapid Charge
ALTIGREEN

Renewable energy ministry to get solar-powered EV-charging carport

Servotech Power Systems Limited recently signed an agreement with the National Solar Energy Federation of India (NSEFI) for the installation of a solar-powered EV charger-enabled carport at the Ministry of New and Renewable Energy's (MNRE) premises in Delhi. This carport is a part of a pilot demonstration by Servotech to showcase its solar and EV charging capabilities blended together in one innovation. The implementation will help gauge its utility to replicate the setup at other strategic locations. Solar-powered and EV charger-enabled carport is one key step in this direction.

Exponent and Park+ to set up rapid charging stations across India

Exponent Energy has partnered with Park + to deploy 1,000 charging zones across India by the end of 2023, starting with Bengaluru. The partnership would help Exponent to build a dense e^pump network by leveraging the real estate and public parking spaces accessible to Park + . The companies are looking to solve the range anxiety that has come since recently. It is usually defined as the fear that an electric vehicle will not have enough battery charge to reach its destination.

Smart meters to be powered by Airtel's cellular IoT solution

Airtel won the cellular IoT solution mandate with TP Western Odisha Distribution Limited (TPWODL) in November. The TPWODL is a joint venture between the government of Odisha and Tata Power. This mandate requires Airtel to power 200,000 smart meters with its IoT solution, of which 70,000 are to be delivered in the first phase. Airtel is already

INTERNATIONAL news

Henkel and LAIIER to scale novel solutions for smart buildings

Sensor maker LAIIER and Germany based chemical and consumer goods company Henkel recently announced a partnership to scale novel printed electronics solutions for smart building applications. The companies plan to drive the implementation of LAIIER´s Severn Water Leak Detector for commercial and industrial buildings and to combine their tech and innovation capabilities to further develop the solution.

Metaverse education alliance to federate metaverse industry leaders

It is said that 70 to 150 million talents are required to realise the metaverse by 2030 and 7 million educators are needed to train the next generation of builders of metaverse. This was discussed in the forum at MetaExpo Singapore where the forum participants agreed that at this stage of market development, the Web3 and metaverse ecosystem should take collective action in creating educational programs.

World Mobile expands its network across Africa

World Mobile is looking to provide connectivity for hard-to-reach areas within Tanzania, Kenya, and Nigeria. After successful pilot tests using low earth orbit (LEO) satellites in the US and the UK, World Mobile is now expanding its network across the African continent. With positive results being found in the ongoing tests of Starlink, one of the many LEO satellites, the company looks to enable services to roll out more efficiently across sub-Saharan Africa. There are an estimated 2.7 billion people who are unconnected globally.

36 Volvo electric trucks ordered by Australia

Volvo Trucks, currently the only global truck manufacturer with a full range of electric trucks in series production, aims for half of its global total sales of new trucks to be electric by 2030. Team Global Express, in line with the country's aim, has placed an order for 36 Volvo trucks of the model Volvo FL Electric. These trucks can operate at a total weight of 16 tonnes. They are equipped with four 66kWh battery packs for increased range and improved charging performance and utilise a 600-volt single motor electric drive system and a 2-speed automated transmission.

Spot AI to transform data from cameras into video intelligence

Video intelligence company Spot AI recently announced that it has raised a sum of $40 million in its Series B funding round. Led by Scale Venture Partners, the financing round saw the participation from existing investors Redpoint Ventures, Bessemer Venture Partners, and new investors StepStone Group and MVP Ventures. The company aims to utilise the funds to transform data from business cameras into video intelligence. It also noted that Hypergrowth Partners joined Spot AI as an advisor.

Locus Robotics raises funds for its warehouses

Locus Robotics recently secured $117 million in its latest round of Series F funding. The round was led by Goldman Sachs Asset Management and G2 Venture Partners. It must be noted that Goldman Sachs MD, Mark Midle, and Zach Barasz, Partner, G2 Venture Partners, will join the Locus Board of Directors. The company aims to rush the funds for fulfilment and distribution warehouses.

Chicony and TI collaborate to roll out 65W laptop adaptor

Chicony Power recently announced its collaboration with semiconductor solutions leader Texas Instruments (TI) to roll out Chicony Power's latest 65W laptop power adaptor, Le Petit, featuring TI's GaN technology. Chicony leveraged TI's half-bridge GaN FET with an integrated gate driver, LMG2610. The official communication noted that the companies collaborated on a design to reduce the size of Chicony's power adaptor by 50% and increase efficiency by up to 94%.

M12 and GitHub partner to launch M12 GitHub Fund

Microsoft's venture fund M12 has partnered with GitHub to launch the M12 GitHub Fund. This fund would provide meaningful resources enabling open source startups that develop on GitHub's platform to achieve their goals. Both parties believe that developers are the heartbeat of enterprise progress and innovation and are looking for investments at the seed stage. This would ensure that the impact, capital, connections, access, and benefits that the founders need are clearly seen.

Shield AI to bolster tech development with infused capital

Shield AI recently announced that it secured additional equity capital of $60 million at its Series E price, whose initial part was closed in June this year. The capital was infused by the US Innovative Technology Fund. Shield AI mentioned that the additional raise closed out the round at $225 million, with $150 million in equity and $75 million in debt. The defence company will bolster its technology development with the infused capital. It is noteworthy that the initial part of Series E made the company the fourth venture-backed, multi-billion-dollar defence-technology startup in two decades.

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working with Punjab, Meghalaya, Jharkhand, West Bengal, and Bihar for multiple utilities. Airtel IoT aims to play a pivotal role in enabling the government of India's ambition to replace 300 million conventional meters with smart meters in the next five years.

Social Alpha set to 'SpIN' with ISRO for space entrepreneurship

In the latest development on the Indian space-tech front, the Indian Space Research Organisation (ISRO) signed an MoU with Social Alpha, an innovation curation and venture development platform, to launch SpaceTech Innovation Network (SpIN). ISRO said that the tie-up is a one-of-a-kind public-private collaboration for startups and SMEs in the space industry. SpIN is India's first dedicated platform for innovation, curation, and venture development for the burgeoning space entrepreneurial ecosystem.

Mahindra to set up EV manufacturing facility in Pune

Mahindra & Mahindra Ltd recently announced that their investment of ₹100 billion for electric vehicles has been approved under the Maharashtra government's industrial promotion scheme for electric vehicles. As per the approved plan, the company's subsidiary will make this investment over the next 7-8 years for setting up the manufacturing facility, development, and production of Mahindra's upcoming Born Electric Vehicles (BEVs), some of which were showcased in Oxfordshire, UK, in August.

German electronics manufacturer Hama enters India

With a legacy of 99 years, the German company Hama recently announced its entry to the Indian market by making strategic tie-ups with the leading distributors and retailers/e-tailers. It plans to launch more than 300 products to tap the new market. It has partnered with e-tailers like Amazon, retailers such as Croma, and Apple Premium Resellers like Maple to "reach out to millions of users across India."

Luxoft expands presence in India with opening of Chennai office

Luxoft has announced a new office in Guindy district of Chennai, with a headcount of 170 top professionals. The company plans to expand to 500 in the next two years. The Chennai office will spur change as one of Luxoft's Global Delivery Centers (GDC), extending the reach of Luxoft's global solutions offerings to more effectively and precisely support regional clients, many of whom are in verticals such as banking and capital markets, oil and gas, and automotive. The Chennai office is Luxoft's third office in India, following Bengaluru that was established in 2017, and Pune established in 2020.

Collins Aerospace opens tech and operations centres in Bengaluru

Collins Aerospace officially inaugurated its new Global Engineering and Technology Center (GETC) and Collins India Operations Center in Bengaluru. These centres have been opened as a part of the company's significant investment to expand its engineering, digital technology, and manufacturing operations in the country. Around 3,000 engineers from three other Collins Aerospace locations in Bengaluru and about 600 personnel from other Raytheon Technologies' group of companies will be moving into the GETC at Northgate Tech Park to facilitate collaboration across the company's businesses.

AMETEK India opens new facility in Bengaluru

After starting its operations in 2009, electronics leader AMETEK India recently inaugurated its new facility in Bengaluru. This new facility is an expansion of AMETEK's innovation hub for numerous industries and also houses a Centre of Excellence that features the latest products from numerous AMETEK businesses.

AMETEK
TMC
LLOYD
TAYLOR HOBSON
AMETE

Ultraviolette gearing up to export to Europe and the US

TVS-backed electric motorcycle firm Ultraviolette Automotive is keeping tabs on exporting its products to Europe and US from the second year of production. The startup is raising its Series D round at a valuation of $300 million, with substantial investments from Qualcomm Ventures, Actor Dulquer Salman, and SaaS unicorn Zoho. The startup is aiming to produce 15,000 units in the first year of its production. The company claims to offer the longest range for any electric two-wheeler in India at over 300km on a single charge.

EV financing startup Vidyut Tech secures $4 million

Vidyut Tech recently bagged $4 million in a mix of equity and debt. The funding round was co-led by Force Ventures, Veda VC, and some strategic clean energy angel investors. The startup aims to utilise the funds to expand its offering across original equipment manufacturer partners across geographies. Vidyut Tech also plans to double the headcount of its credit, engineering, and sales teams in 2023.

Foxconn Singapore injects $500 million in Indian unit

Foxconn announced that its Singapore unit had acquired 4.08 million shares in its Indian subsidiary, Foxconn Hon Hai Technology India Mega Development Pvt Ltd, for $500 million.

The company plans to boost the workforce at its plant in Tamil Nadu to 70,000 by adding 53,000 more workers over the next two years. The plant, called Hon Hai Precision Industry Co. Ltd, was opened in 2019 and has ramped up production ever since. It began producing the iPhone 14 in September of this year.

Elin Electronics IPO has been fully subscribed

The initial public offering (IPO) of Elin Electronics Limited (EEL) launched in December at a price band of ₹237-₹247 per share was fully subscribed. The company plans to raise ₹4.75 billion, of which ₹1.75 billion worth of shares are being raised via a fresh issue and ₹3 billion via an offer for sale by promoters and shareholders. The company intends to use the net proceeds raised from IPO worth ₹880 million to pay off existing debt while ₹375.9 million would be used for improving and expanding its existing plants at Ghaziabad in Uttar Pradesh and Verna in Goa.

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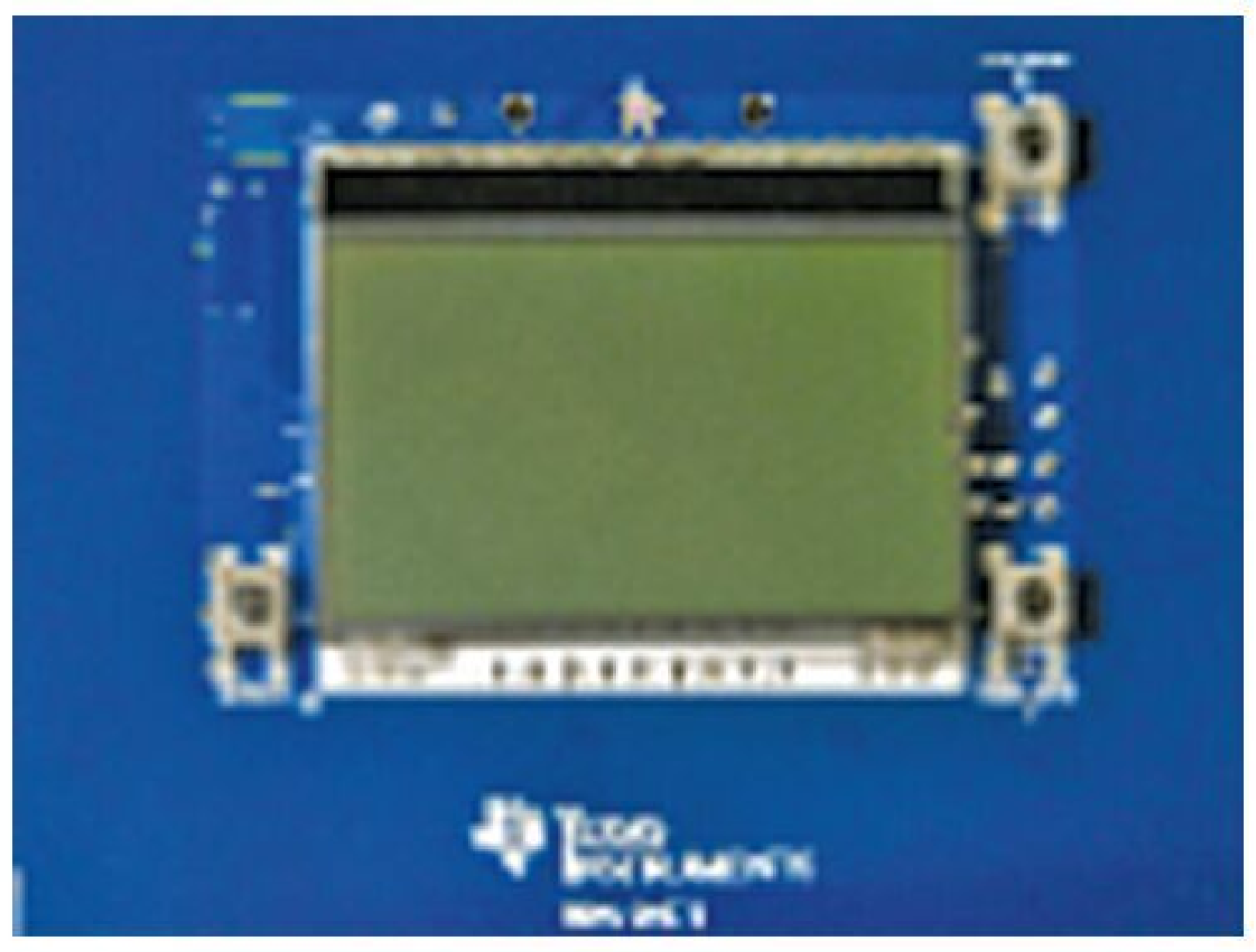
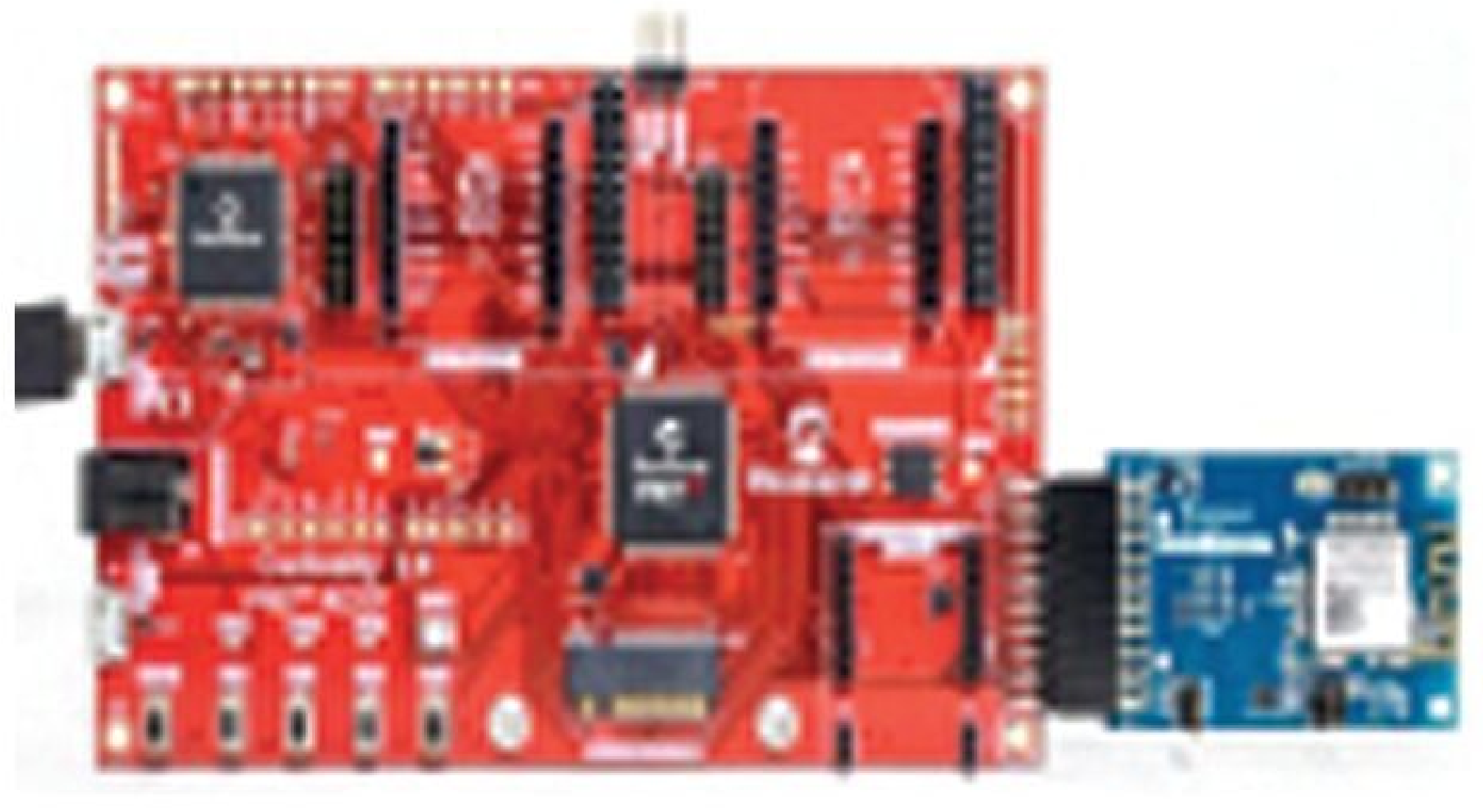
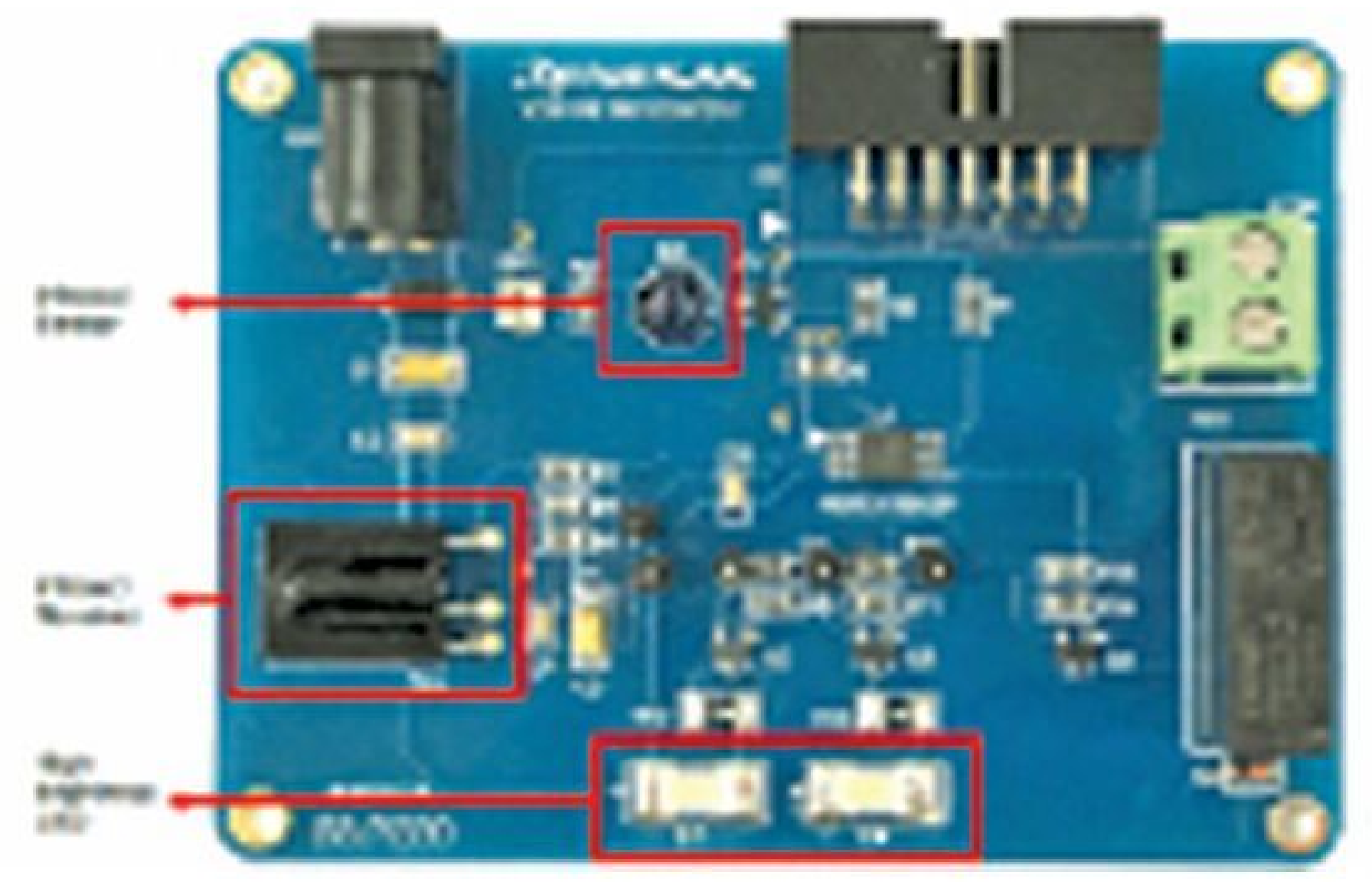
5 Interesting REFERENCE DESIGNS

Title of Reference Design	Backlight and Smart Lighting Control	Remote Controlled BLDC Fan
Image		
Key Attraction	The reference design features an optical light sensor and a proximity sensor to detect ambient light intensity and human presence respectively. Based on the above factors, the design adjusts the brightness of a light that is most comfortable for the human eyes. ADI's solution can simultaneously transmit data and power beyond 1km.	This reference design is of a remote-controlled brushless DC (BLDC) motor driver for ceiling fan application. The BLDC fan offers higher efficiency and silent operation compared to a conventional fan.
Highlights	The reference design features an optical light sensor which detects the intensity of light in the surrounding environment. The design also has a proximity sensor which detects human presense and adjusts the brightness of a light or a display that is most comfortable for the human eyes. A simple algorithm included in the reference design package determines the ideal backlight brightness when the backlight is activated. Proximity wake-up is enabled by Texas Instruments' capacitive-to-digital converter. A capacitive sensor located around the edge of the board provides a 360-degree sensing field around the board. The reference design enables more comfortable viewing experience and higher energy saving for the customers.	The reference design is for a brushless DC (BLDC) ceiling fan which can be controlled using most off-the-shelf IR remotes. It has an efficiency of over 85% and consumes a low power of 30-40 watts, which is less than half the power consumed by existing fans. The reference design can work over a wide range of input voltage ranging from 90V AC to 265V AC. Unlike the existing induction motors used in conventional fans, the BLDC motors do not have brushes, so they last longer. Furthermore, this reference design with BLDC motors provides a higher torque/power-to-weight ratio and runs efficiently and silently compared to brushed DC motors. The reference design employs a 24V three-phase motor driver to drive motors with sinusoidal current and sensorless control. The reference design also features a value-line processor that enables remote control by decoding infrared signals. The included firmware allows easy integration with standard infrared remotes based on the NEC transmission protocol, thus allowing the users to use most off-shelf remotes to control the fan.
Application	The module can control the light of a room or the backlight of a display.	The reference design is suitable for use in residential and commercial purposes.
OEM Brand	Texas Instruments	Texas Instruments
URL	https://www.electronicsforu.com/electronics-projects/electronics-design-guides/reference-design-for-backlight-and-smart-lighting-control	https://www.electronicsforu.com/electronics-projects/industry-grade-projects/reference-design-for-a-remote-controlled-bldc-fan
QR Code		

For Smart Homes/Offices

The author, Sharad Bhowmick, works as a Technology Journalist at EFY. He is passionate about power electronics and energy storage technologies. He wants to help achieve the goal of a carbon neutral world.

Wi-Fi Based Remote Control for Lighting and Other Appliances	PowerPoint Presenter	Infrared Human Sensor
		
This reference design is for a universal remote control that can be used to switch on/off any appliance or light from your mobile device. It can help you automate your house.	This reference design of a low-powered PowerPoint presenter enables users to control slides by exchanging data with a PC through Bluetooth Low Energy (BLE) communication. It has an operational range of up to 30 metres.	This reference design is for a low-cost human presence detector. The design can help you automate lighting, doors, and appliances to work automatically when someone walks in or walks out.
The reference design from Microchip lets you connect and program smart devices, smart appliances, and smart gadgets in your home. It employs a Curiosity PIC32MZ EF 2.0 development board featuring a 32-bit PIC32MZ EF microcontroller. The reference design can also be used to control the red/green/blue (RGB) LED lights from the smartphone or a PC. The reference design requires a WINC1500 Xplained Pro Extension Board plugged into the Curiosity board's XPRO connector to enable and configure Wi-Fi connectivity. A web page hosted by the Curiosity board provides the interface to control any appliance or change the colour of the onboard RGB LED.	This reference design from Renesas is a PowerPoint (PPT) presenter solution that enables the user to easily change the page by pressing a page-down key or page-up key on the PPT presenter when showing a PPT file. The presenter allows the user to wirelessly control and present the slides without any human intervention with the computer. The remote connects with the computer or multimedia projector via Bluetooth Low Energy (BLE). The reference design is based on the RL78/G1D module and works on a 3V CR2032 lithium battery and has a low power consumption of 2.6 mA in RF low power consumption mode. It has a working range of up to 30 metres and is compatible with both Windows and Android platforms.	This reference design from Renesas is a low-cost infrared human sensor that is based on the reflective infrared induction principle. The energy-saving design requires few components to construct, making it inexpensive and ideal for lighting entrances, porches, stairs, and bathrooms. The reference design can also be incorporated with the automatic doors, fans, and other appliances to automate them. The design uses an RL78/G10 microcontroller (MCU), which is a 10-pin LSSOP general-purpose MCU. When people come close, the bulb lights up, and when they leave, the bulb switches off automatically. This design can work with a 220V AC supply and has a low power consumption. It is capable of relaying an output of up to 3A/250V AC and has a fast response time.
The reference design is suitable for use in residential and commercial purposes.	The reference design can be used for presenting slides during meetings and presentations.	The reference design can be used in residential or commercial buildings, industrial setups, and even in public places to detect human presence.
Microchip	Renesas	Renesas
https://www.electronicsforu.com/electronics-projects/electronics-design-guides/reference-design-for-a-wi-fi-based-remote-control-for-lighting-and-other-appliances	https://www.electronicsforu.com/electronics-projects/electronics-design-guides/reference-design-of-a-powerpoint-presenter	https://www.electronicsforu.com/electronics-projects/electronics-design-guides/this-reference-design-can-be-integrated-with-light-to-build-temporary-lighting-in-entrances-porches-stairs-and-bathrooms

EFY TESTED
Ashwini K. Sinha

THERMAL MANAGEMENT SYSTEM
For Electric Vehicles

E.VENKATESAN AND M.DINESH

Recently some electric bikes caught fire due to failure of battery management system because of poor battery design. Unfortunately, proper thermal management is not there in most electric vehicles at present. So, here is a project to monitor the battery temperature and smoke detection to alert the EV user and stop the EV well in time to avoid further damage. The authors' prototype of the thermal management system is shown in Fig. 1 and its block diagram is shown in Fig. 2.

Lithium-ion battery has a specified operational temperature of -20°C to +60°C. It will provide the longest service life if its temperature is always kept within approximately 10°C to 40°C.

The proposed system, powered by a 12V battery, is built around

BILL OF MATERIAL

Components	Quantity	Description
ESP32 (U1)	1	ESP32 development doard
DS18B20 (U2)	1	Temperature sensor
MQ135 (U3)	1	Smoke detector
RG1602A (U4)	1	I2C 16x2 LCD display
LM7805 (U5)	1	5V voltage regulator
10k (R1)	1	Potmeter
1k (R2, R3)	2	¼-watt resistor
1N4009 (D1, D2)	2	Rectifier diode
100nF (C1, C2)	2	Ceramic disk capacitor
SU1	1	Buzzer
GU-SH112D (RL1)	1	High-power switching relay
BC547A (Q1, Q2)	2	Transistor (npn type)
On/off switch (S1)	1	SPDT switch
12V battery (BT1)	1	Lithium-ion battery
60V/40A/2.4kW (BT2)	1	Electric vehicle battery
Smartphone	1	Android mobile phone
Arduino Blue Control app		Need to download
IDE Arduino software		Need to download

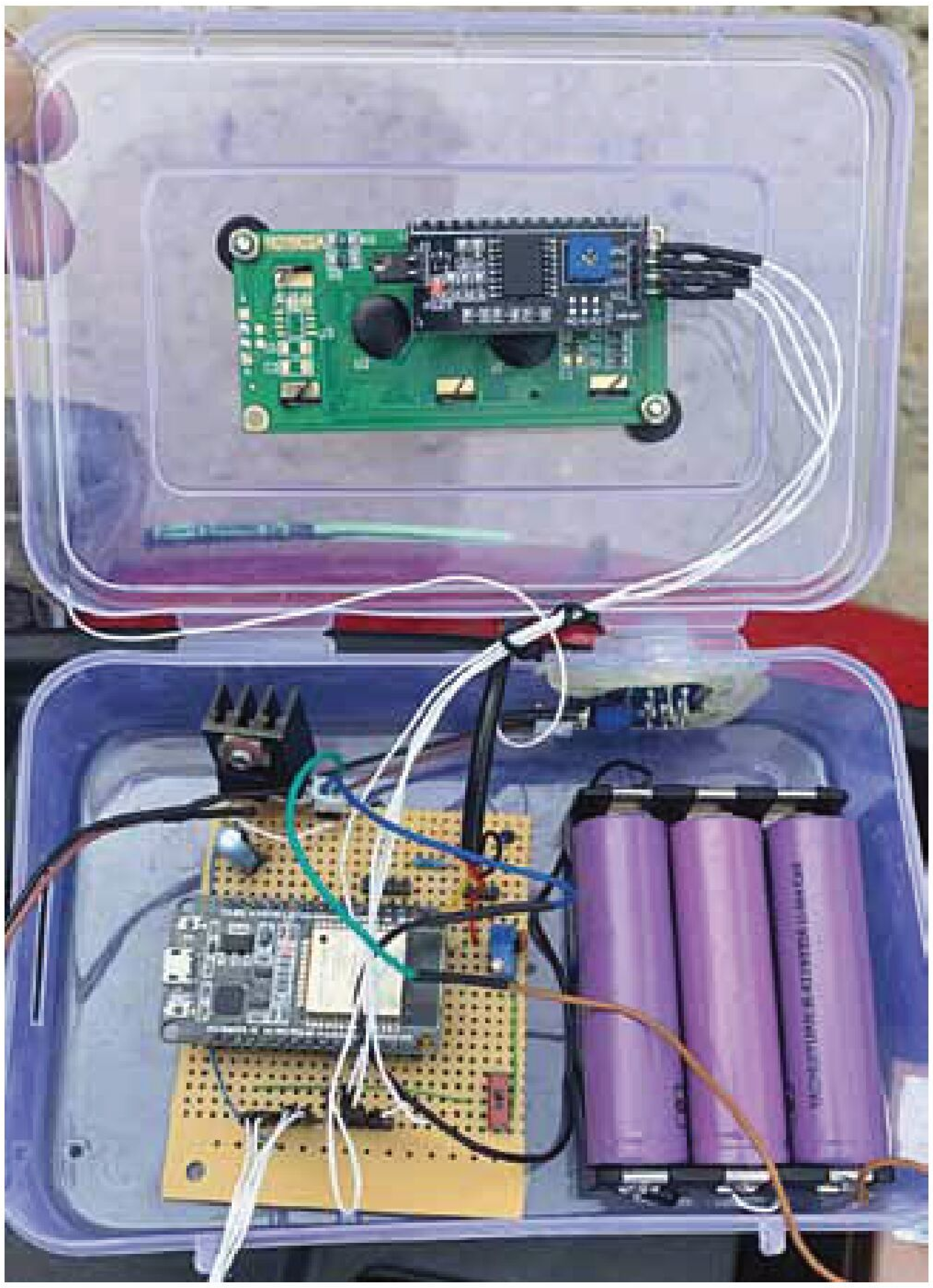


Fig. 1: The authors' prototype

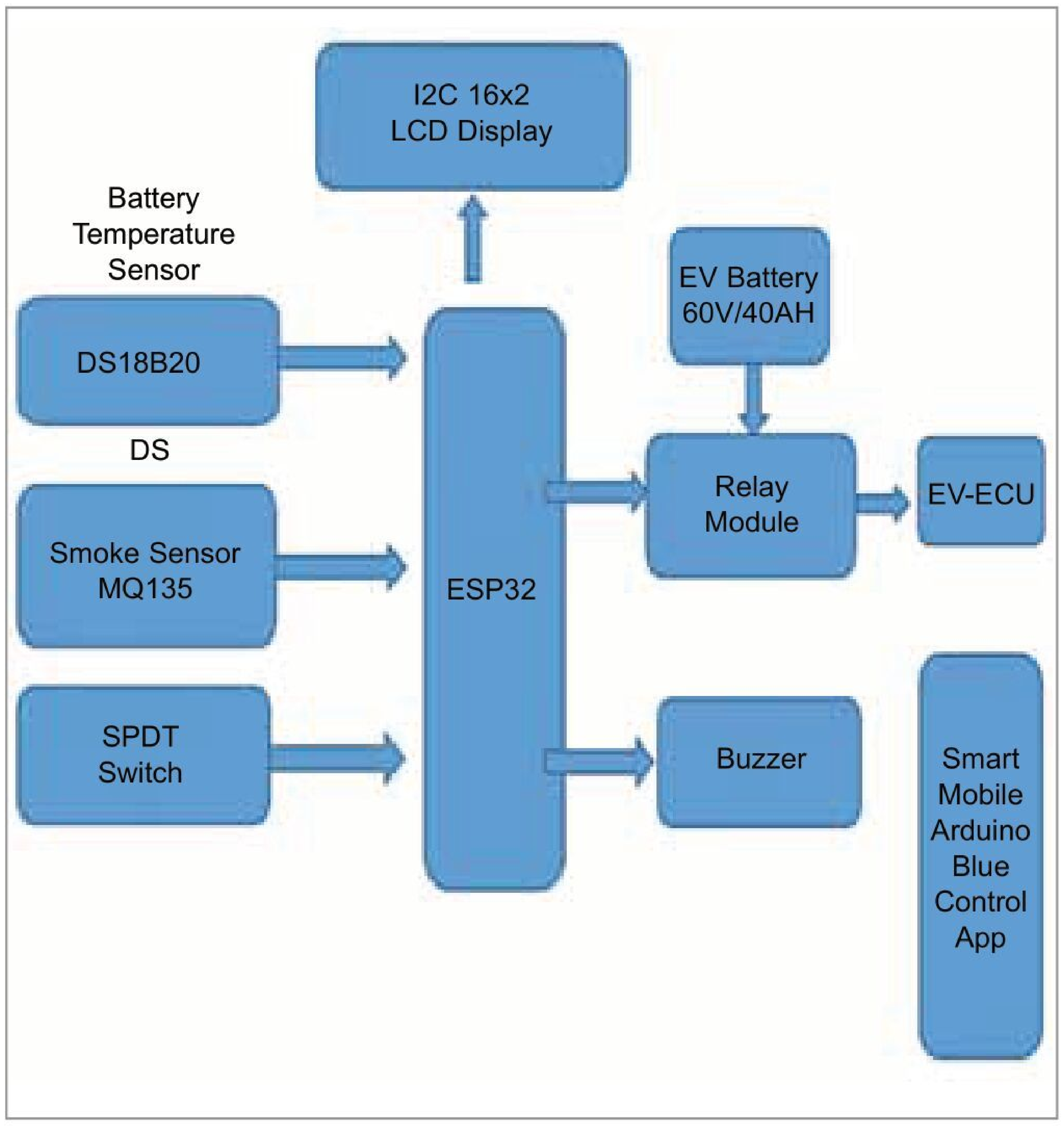

I2C 16x2
LCD Display
Battery
Temperature
Sensor
DS18B20
DS
Smoke Sensor
MQ135
SPDT
Switch
ESP32
EV Battery
60V/40AH
Relay
Module
EV-ECU
Buzzer
Smart
Mobile
Arduino
Blue
Control
App

Fig. 2: Block diagram of thermal management system

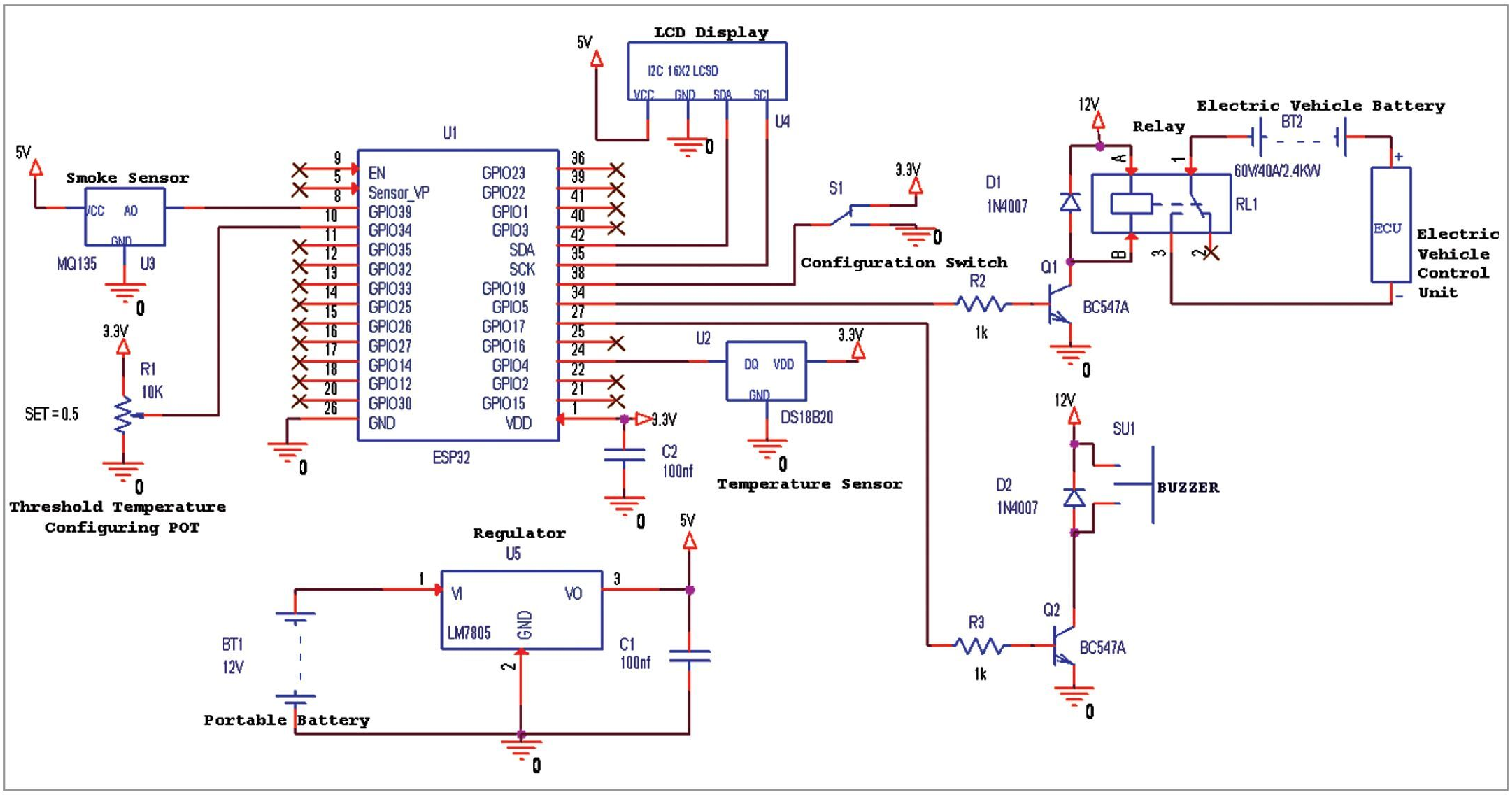
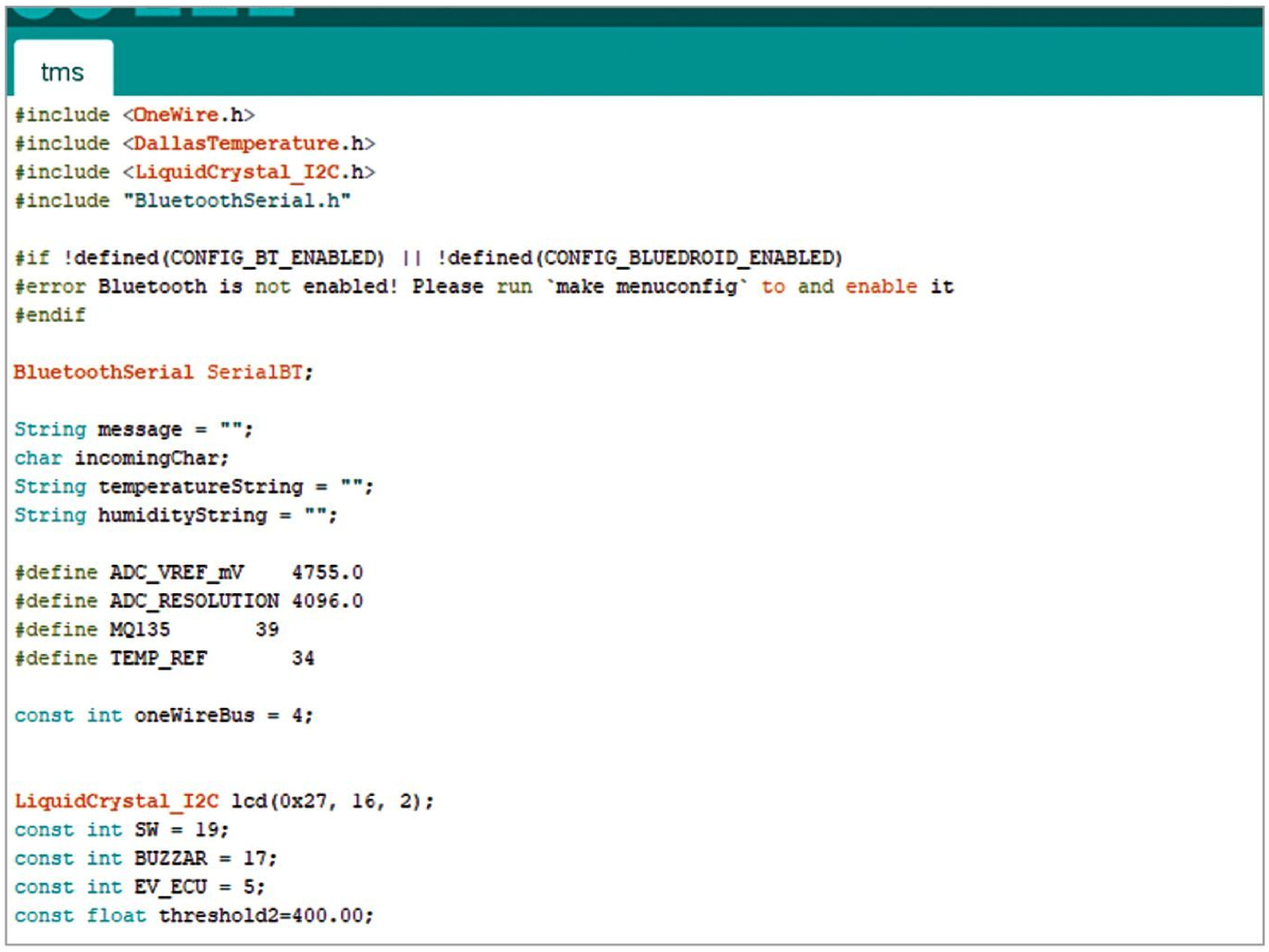

LCD Display
I2C 16X2 LCSD
VCC GND SDA SCL
U4
5V
U1
ESP32
EN
Sensor_VP
GPIO39
GPIO34
GPIO35
GPIO32
GPIO33
GPIO25
GPIO26
GPIO27
GPIO14
GPIO12
GPIO30
GND
GPIO23
GPIO22
GPIO1
GPIO3
SDA
SCK
GPIO19
GPIO5
GPIO17
GPIO16
GPIO4
GPIO2
GPIO15
VDD
Smoke Sensor
VCC AO GND
MQ135
U3
3.3V
R1
10K
SET = 0.5
Threshold Temperature Configuring POT
C2
100nf
U2
DQ VDD GND
DS18B20
Temperature Sensor
S1
Configuration Switch
R2
1k
D1
1N4007
Q1
BC547A
12V
Relay
RL1
Electric Vehicle Battery
BT2
60V/40A/2.4KW
ECU
Electric Vehicle Control Unit
SU1
BUZZER
D2
1N4007
R3
1k
Q2
BC547A
Regulator
U5
LM7805
VI VO GND
C1
100nf
BT1
12V
Portable Battery

Fig. 3: Circuit diagram of thermal management system



```
#include <OneWire.h>
#include <DallasTemperature.h>
#include <LiquidCrystal_I2C.h>
#include "BluetoothSerial.h"

#if !defined(CONFIG_BT_ENABLED) || !defined(CONFIG_BLUEDROID_ENABLED)
#error Bluetooth is not enabled! Please run `make menuconfig` to and enable it
#endif

BluetoothSerial SerialBT;

String message = "";
char incomingChar;
String temperatureString = "";
String humidityString = "";

#define ADC_VREF_mV    4755.0
#define ADC_RESOLUTION 4096.0
#define MQ135       39
#define TEMP_REF       34

const int oneWireBus = 4;


LiquidCrystal_I2C lcd(0x27, 16, 2);
const int SW = 19;
const int BUZZAR = 17;
const int EV_ECU = 5;
const float threshold2=400.00;
```

Fig. 4: Code snippet

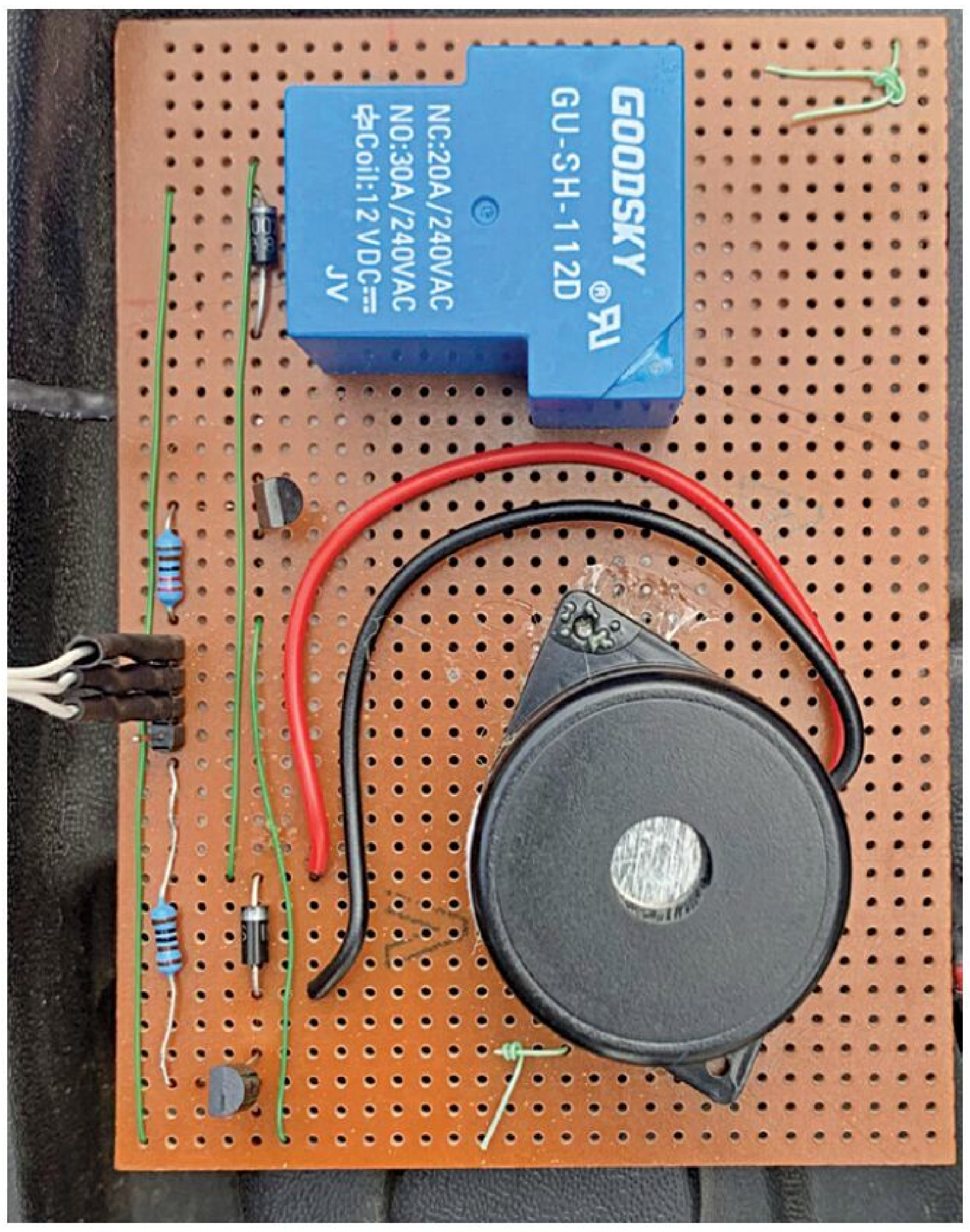

GOODSKY
GU-SH-112D
NC:20A/240VAC
NO:30A/240VAC
Coil:12VDC
JV

Fig. 5: Relay connection prototype

ESP32 board (U1), temperature sensor DS18B20 (U2), smoke sensor MQ135 (U3), 16 × 2 LCD display (U4), 5V regulator LM7805 (U5), and a few other components. The SPDT switch and potentiometer are connected to input of ESP32 controller while I2C, 16 × 2 LCD display, buzzer, relay, and Arduino Blue Control application are connected to its output. SPDT switch S1 is for mode selection to display the current temperature or to configure the threshold.

Software

The Arduio IDE is not ready to program ESP board by default, so go to Board Manager and install it. Install the latest Arduino IDE library for the software. Later install the libraries needed for interfacing the sensor.

Here DallasTemperature and LiquidCrystal are used for interfacing the sensor and display, so open Library Manager and install these libraries.

Download the code for this pro-

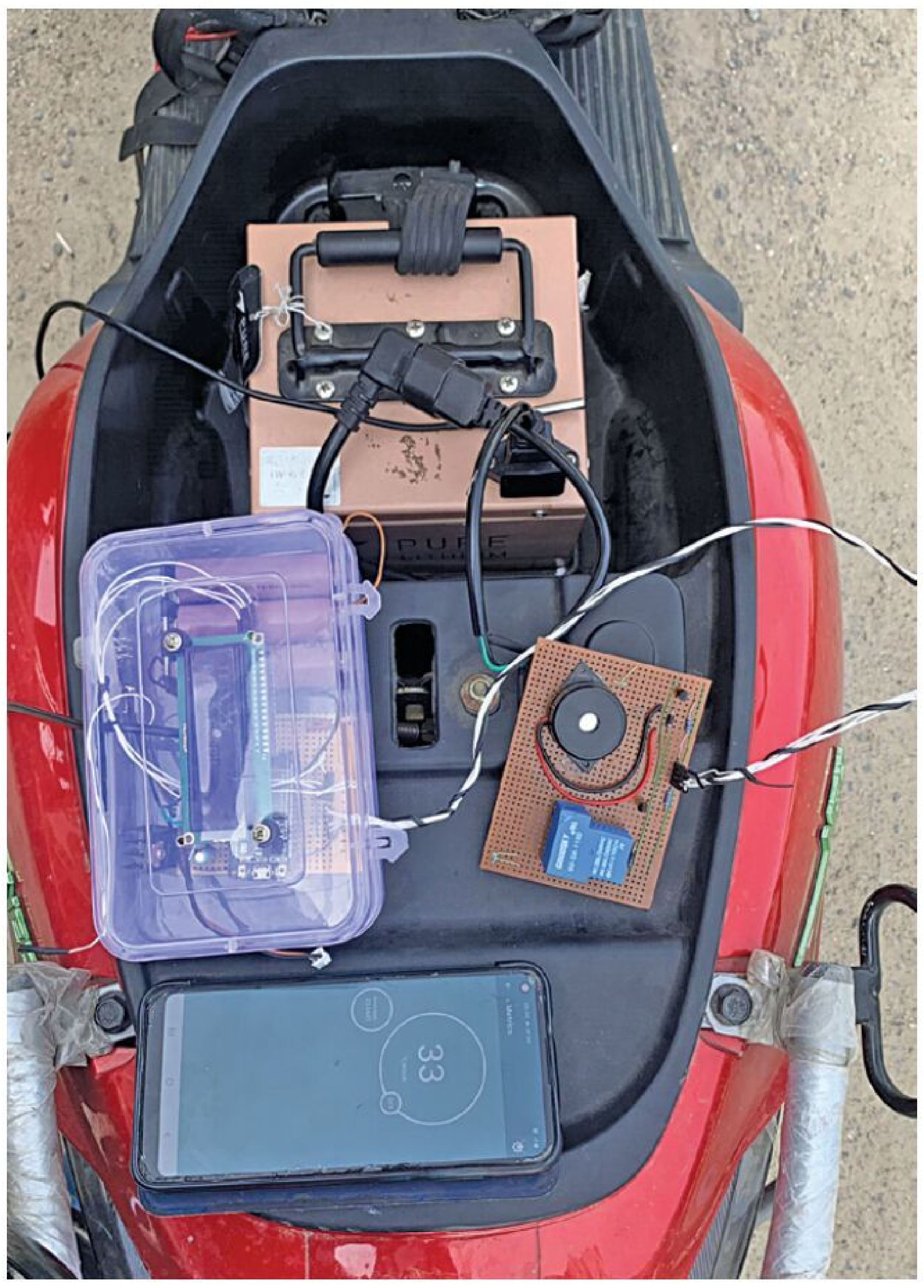
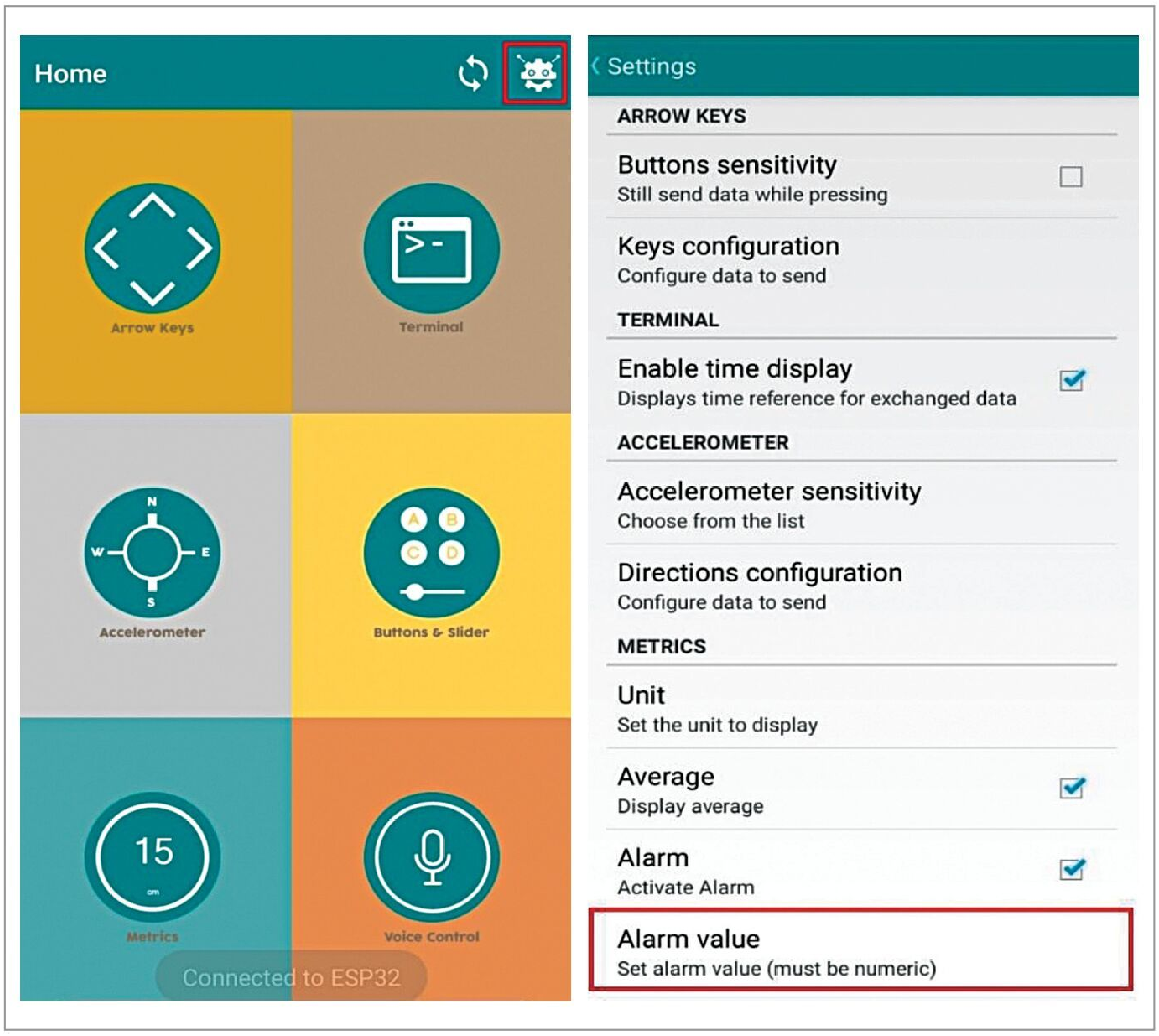


Fig. 6: Testing the device in an EV


Home
Arrow Keys
Terminal
Accelerometer
Buttons & Slider
15
Metrics
Voice Control
Connected to ESP32

Settings

ARROW KEYS

Buttons sensitivity
Still send data while pressing ☐

Keys configuration
Configure data to send

TERMINAL

Enable time display
Displays time reference for exchanged data ☑

ACCELEROMETER

Accelerometer sensitivity
Choose from the list

Directions configuration
Configure data to send

METRICS

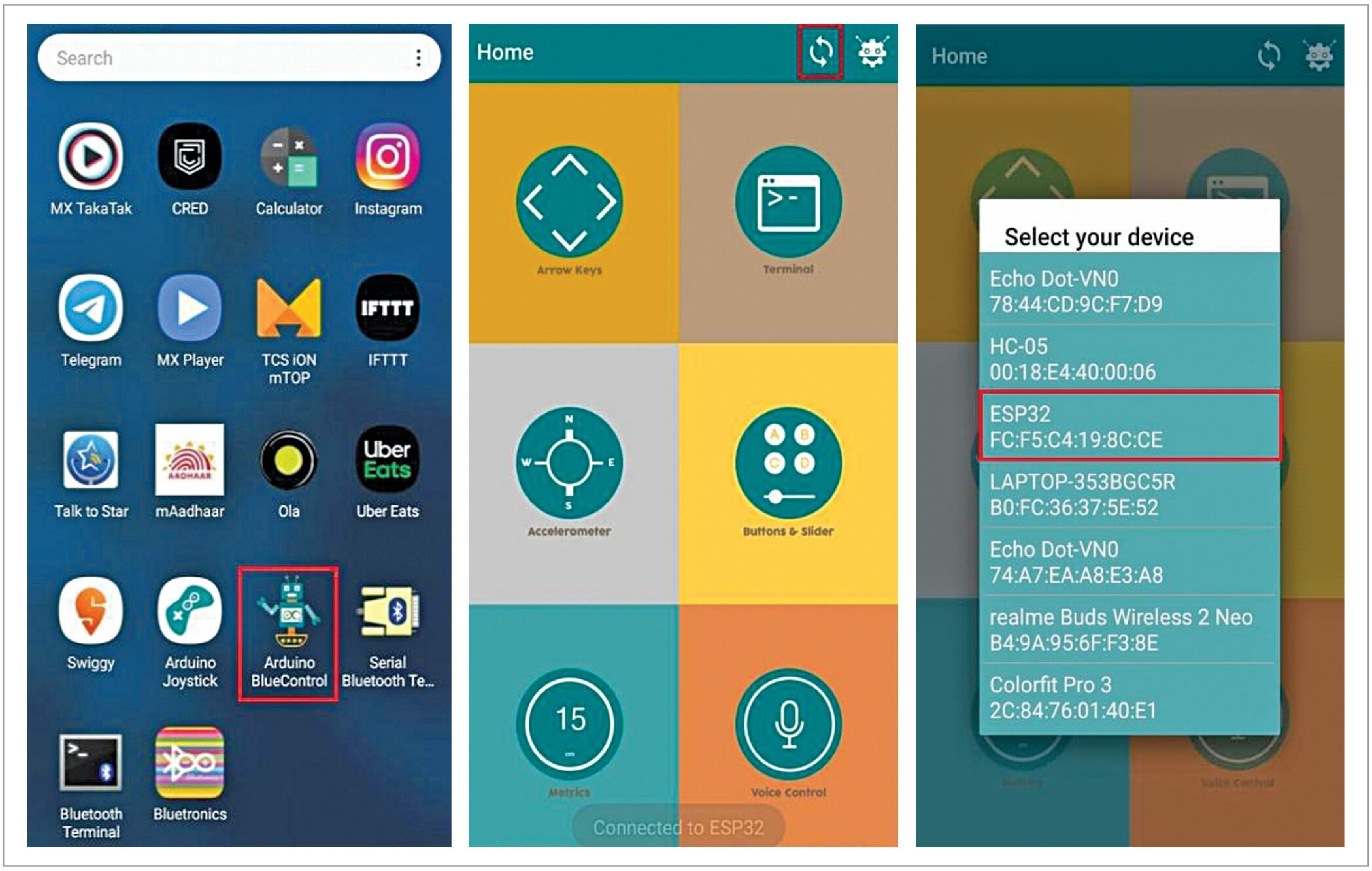
Unit
Set the unit to display

Average
Display average ☑

Alarm
Activate Alarm ☑

Alarm value
Set alarm value (must be numeric)

Fig. 8: Setting alarm


Search
MX TakaTak
CRED
Calculator
Instagram
Telegram
MX Player
TCS iON mTOP
IFTTT
Talk to Star
mAadhaar
Ola
Uber Eats
Swiggy
Arduino Joystick
Arduino BlueControl
Serial Bluetooth Te...
Bluetooth Terminal
Bluetronics
Home
Arrow Keys
Terminal
Accelerometer
Buttons & Slider
15
Metrics
Voice Control
Connected to ESP32
Home

Select your device

Echo Dot-VN0
78:44:CD:9C:F7:D9

HC-05
00:18:E4:40:00:06

ESP32
FC:F5:C4:19:8C:CE

LAPTOP-353BGC5R
B0:FC:36:37:5E:52

Echo Dot-VN0
74:A7:EA:A8:E3:A8

realme Buds Wireless 2 Neo
B4:9A:95:6F:F3:8E

Colorfit Pro 3
2C:84:76:01:40:E1

Fig. 7: Connecting Bluetooth

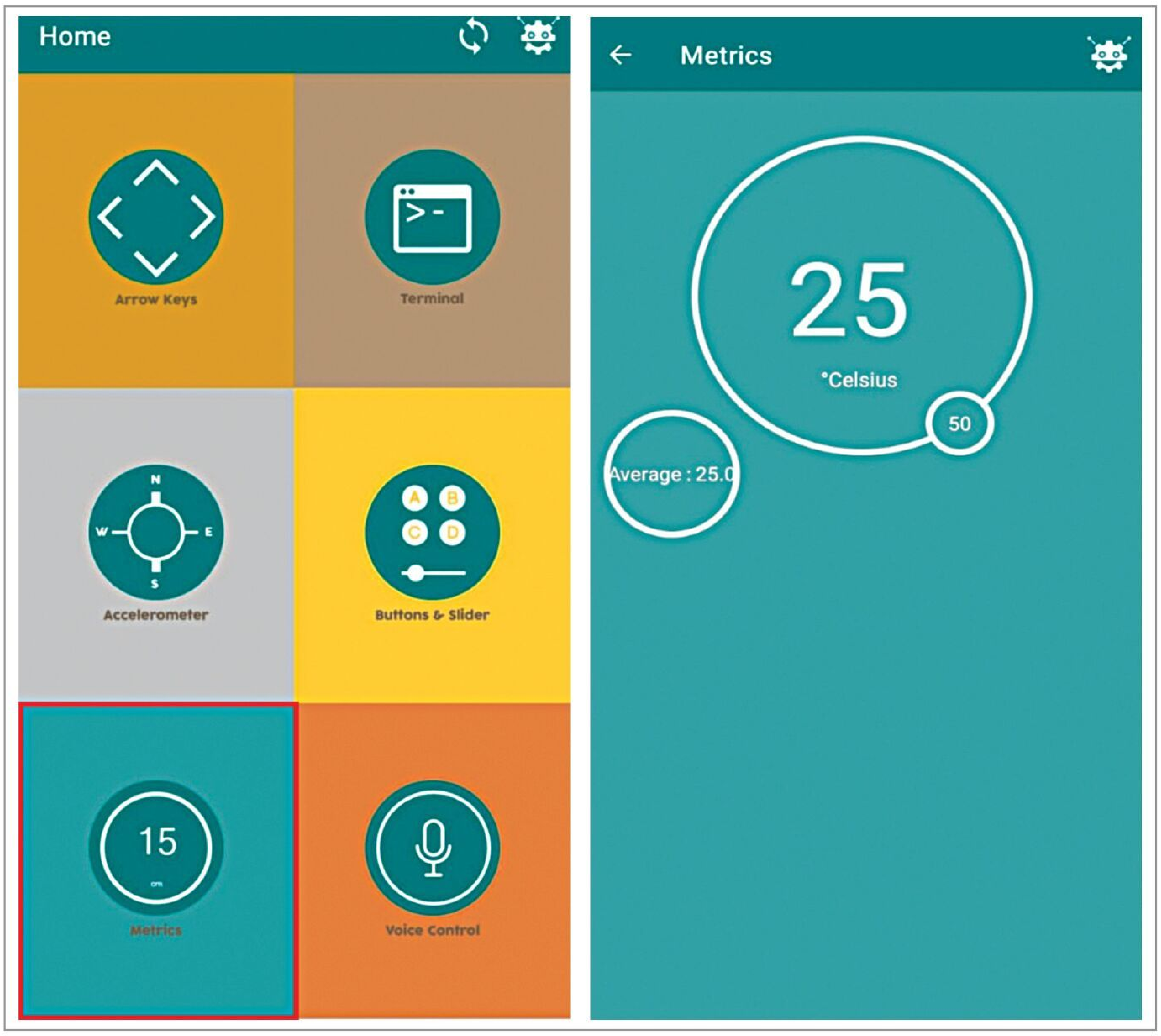


Fig. 9: App display

ject and select the port and board in Arduino IDE. Connect the ESP32 to your laptop and press the Boot button to bring the ESP32 board in program uploading mode and then upload the code to ESP32 board. The code can be download using the link *https://www.electronicsforu.com/electronics-projects/thermal-management-systems-for-electric-vehicle*

Construction and testing

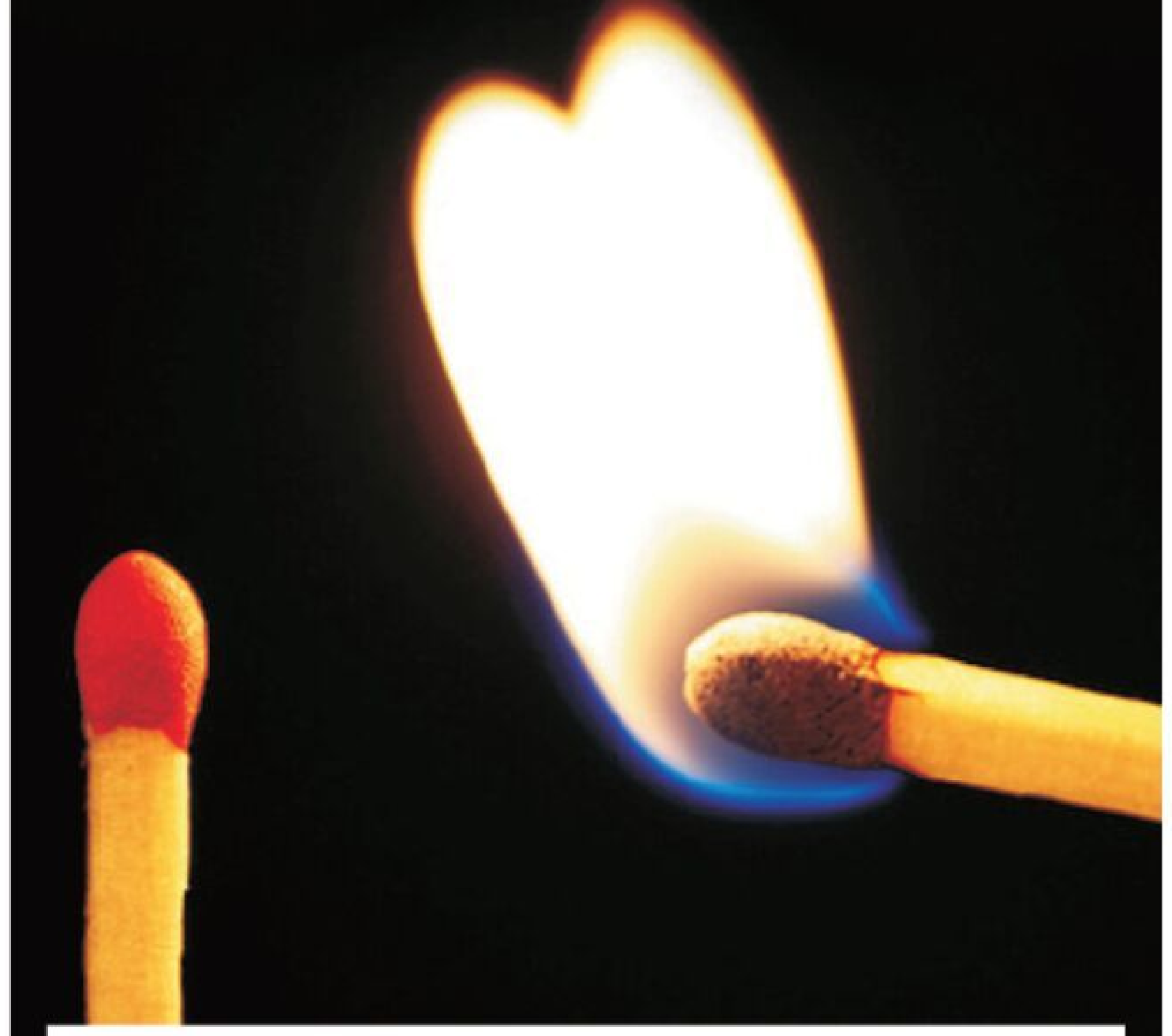
After uploading the source code tms.ino into ESP32 board, connect the components as per circuit diagram in Fig. 3. In place of the voltage regulator circuit a 5V battery or 5V DC adaptor can be used to power the device. Relay connection prototype is shown in Fig. 5.

For installing the circuit into an electric vehicle refer Fig. 6. For testing the project refer Fig. 6 through Fig. 9. A Bluetooth terminal app is required to monitor the battery temperature and smoke data on phone. So, you may install the Arduino Blue Control app in your phone.

Power the device and connect the app with Bluetooth. You would now be able to see the temperature of battery in app. Whenever the temperature rises above the threshold set, or any smoke is detected by sensor, the app gives an alert and cuts off power supply to the vehicle's battery through the relay. EFY

Both E. Venkatesan (left) and M. Dinesh (right) work as a Product Application Team Lead in Qmax Test Equipment Pvt Ltd and are interested in the areas of IoT, BMS, wireless technologies, and embedded systems.

EFY Note
The source code of this project is available for free download at *www.electronicsforu.com*



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Highlights of QUIKorrect:

20 KVA
3 - Phase Quikorrect Static Voltage Stabilizer
OFF
ON
Medi

- Single phase, 85V to 300V input range, output 220V +/- 1% or 230V +/- 1%
- Three phase, 148V to 520V input range, output 381V or 400V or 415V +/- 1%
- Voltage imbalance correction: If input R = 85V, Y = 300V, B = 180V
  Output R = 220V, Y = 220V, B = 220V
- Or Input R-Y = 350V, Y-B = 420V, B-R = 234V
  Output: R-Y = 400V, Y-B = 400V, B-R = 400V.
- No wear and tear like servo stabilizers.
- No tap changing like SCR or relay based stabilizers
- 1% tight regulation.
- Can handle 10 times surge load.

Features:

- Instantaneous correction. Speed over 20000V per second
- Discrete IGBT up to 90KVA three phase and IGBT module up to 200KVA three phase
- Protections:- overload, short circuit, low voltage, high voltage etc.
- Can withstand up to 800V continuous input
- 6KV lightning protection for 8/20uS
- Protection for neutral failure/neutral floating & double phase, no need for isolation transformer.
- Uninterrupted bypass during very high surge load > 10 times.
- LCD & data storage for over one year
- IOT cloud monitoring, control & graphical analysis.
- Data of more than 1 year can be stored - Input V, Output V, Load, Power failure etc with date and time stamp.
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NEW PW8001

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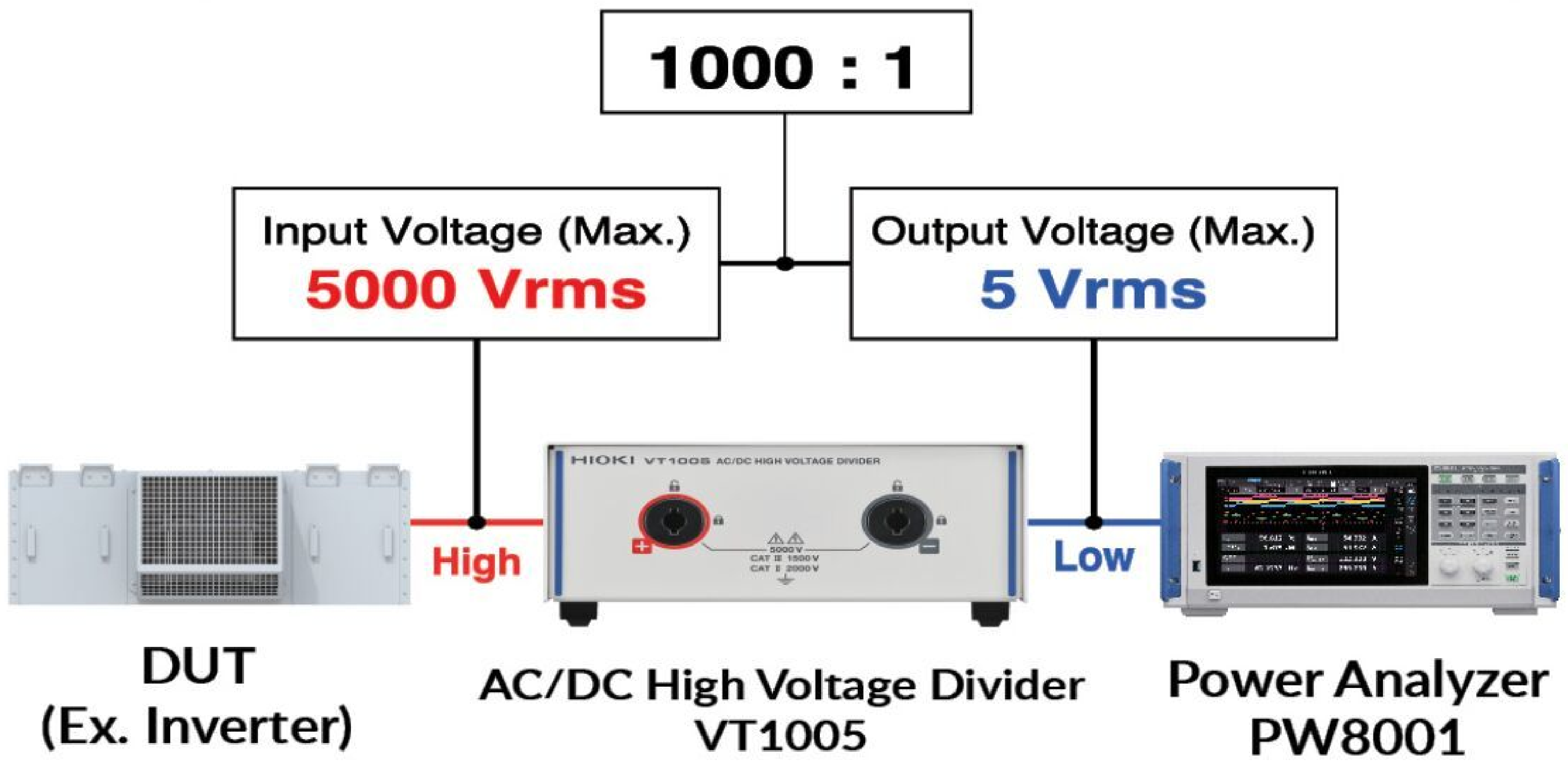
±0.03%

NEW VT1005

HIOKI VT1005 AC/DC HIGH VOLTAGE DIVIDER
5000 V
CAT III 1500 V
CAT II 2000 V

Detect Efficiency Improvement Effects on the Order of 0.1%

Safely Measurement Test


1000 : 1

Input Voltage (Max.)
5000 Vrms

Output Voltage (Max.)
5 Vrms

High

Low

DUT
(Ex. Inverter)

AC/DC High Voltage Divider
VT1005

Power Analyzer
PW8001

CE

3 year Warranty

Testing Solutions For Inverters

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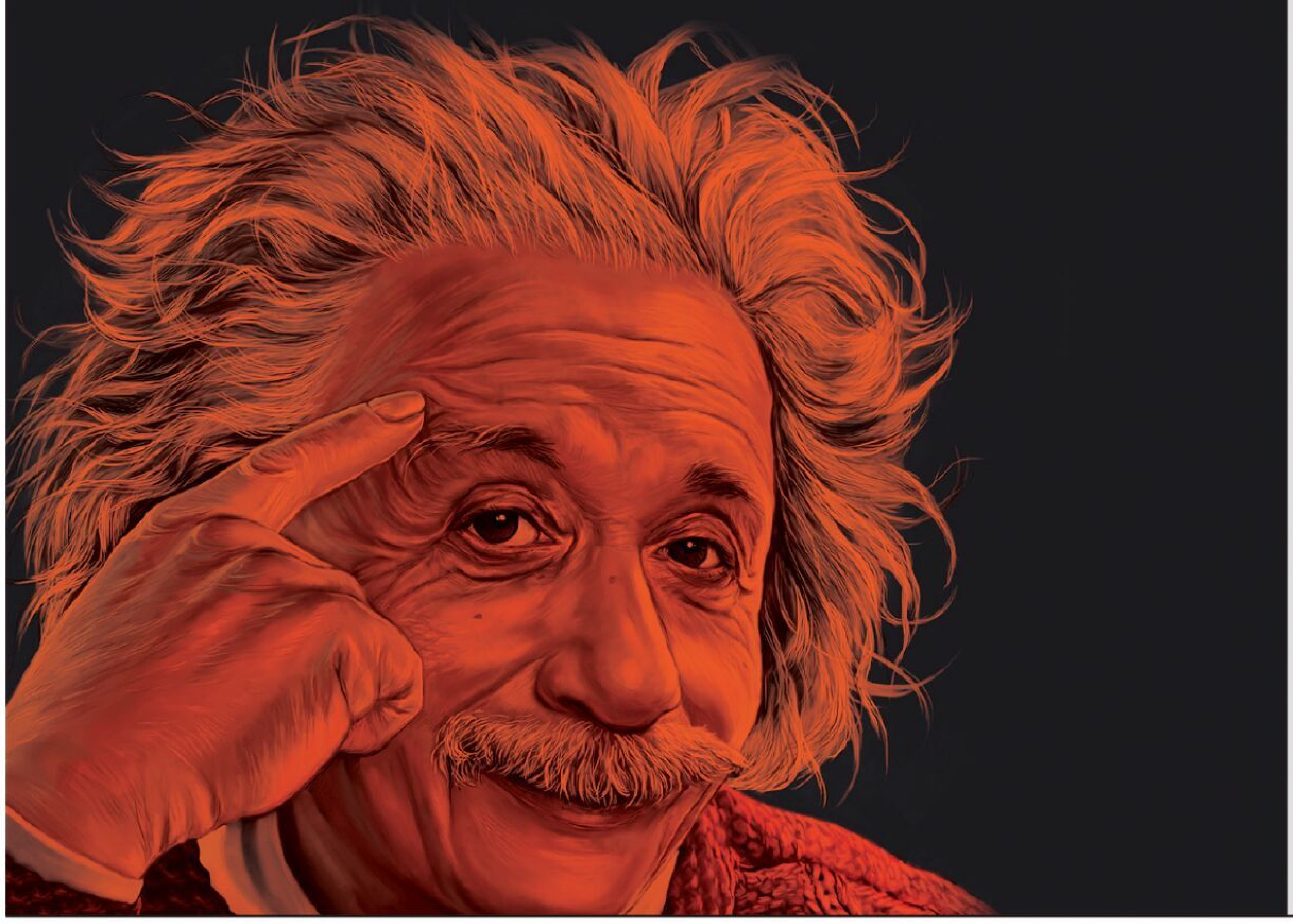
Once you stop learning, you start dying.

—Albert Einstein



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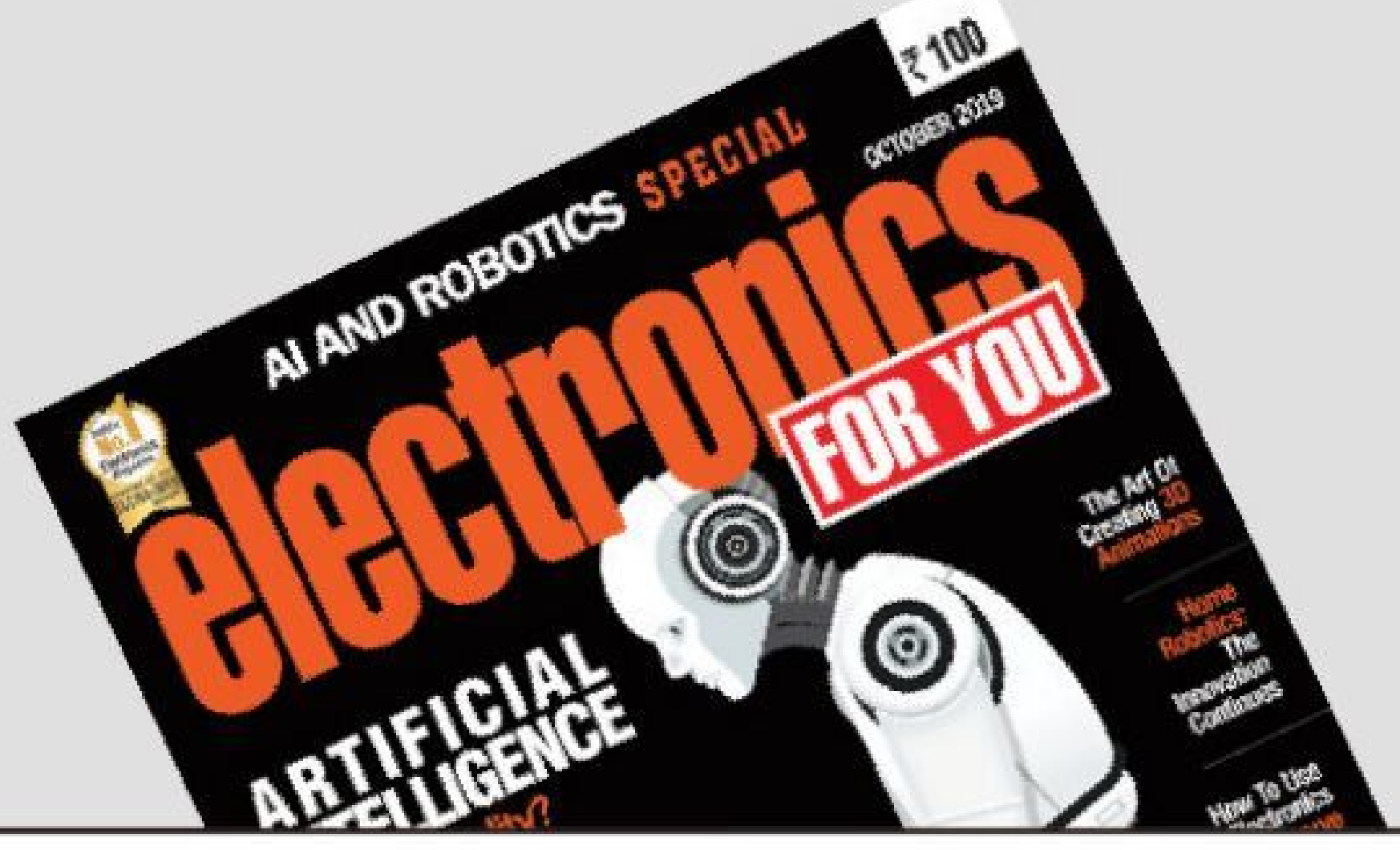

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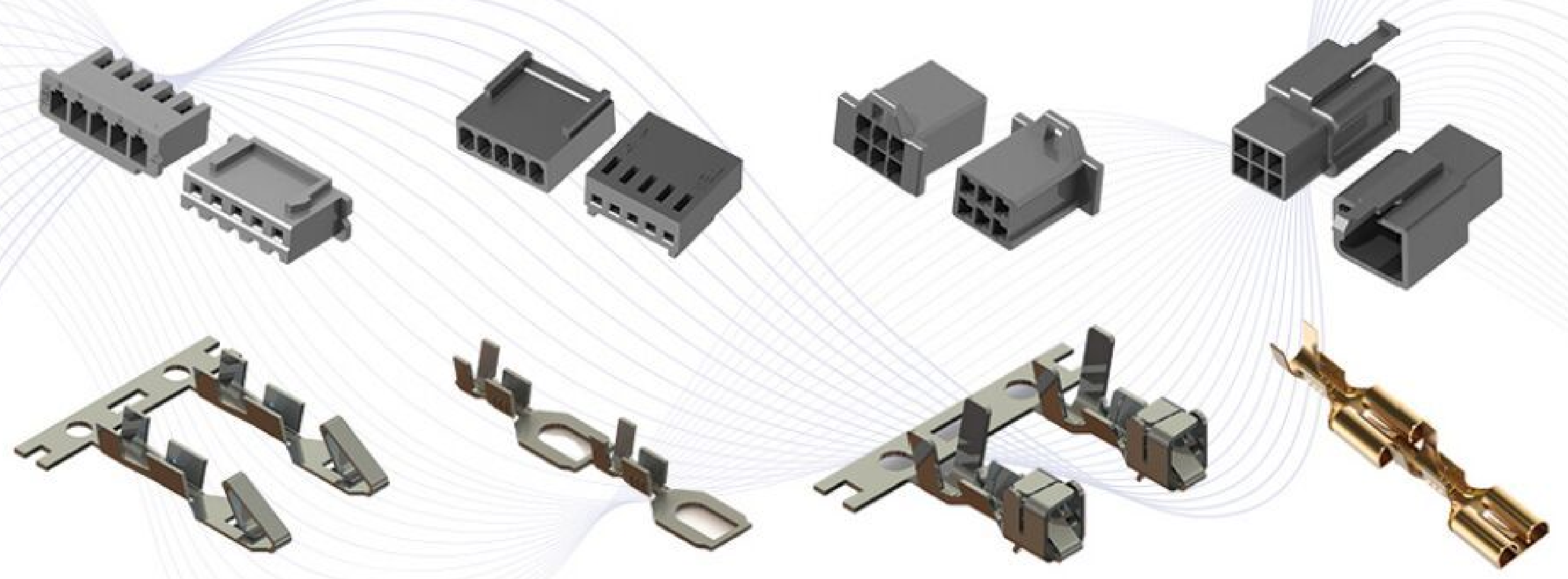

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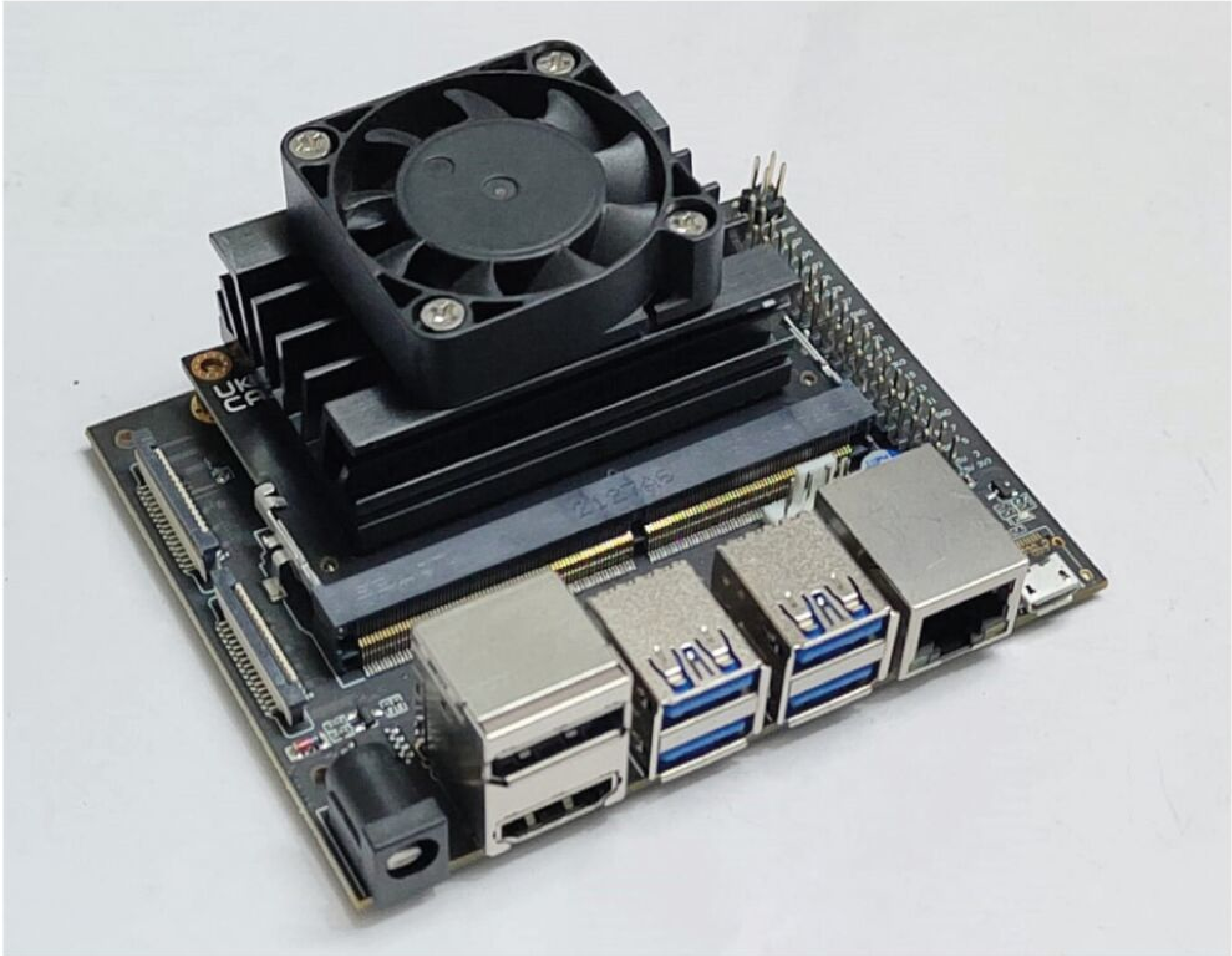
EAGLE-101 : Carrier Board / Full System - Designed for NVIDIA® Jetson Nano™ Module

The EAGLE -101 carrier board has been developed by Tanna TechBiz and is a make in India initiative. This board has been designed for the NVIDIA® Jetson Nano™ Module.

The board features rich I/0 ports that includes 4* USB 3.0,1 * GB Ethernet, Micro SD card slot etc.., wide range of temperature specification and at the same time, packaged together in a compact size

The entire system constituting of the carrier board and module can be used for a wide array of use cases ranging from computer vision, robotics, factory automation, Traffic management solutions (ITMS), Smart Cities and so on.

These products comes in two variants.

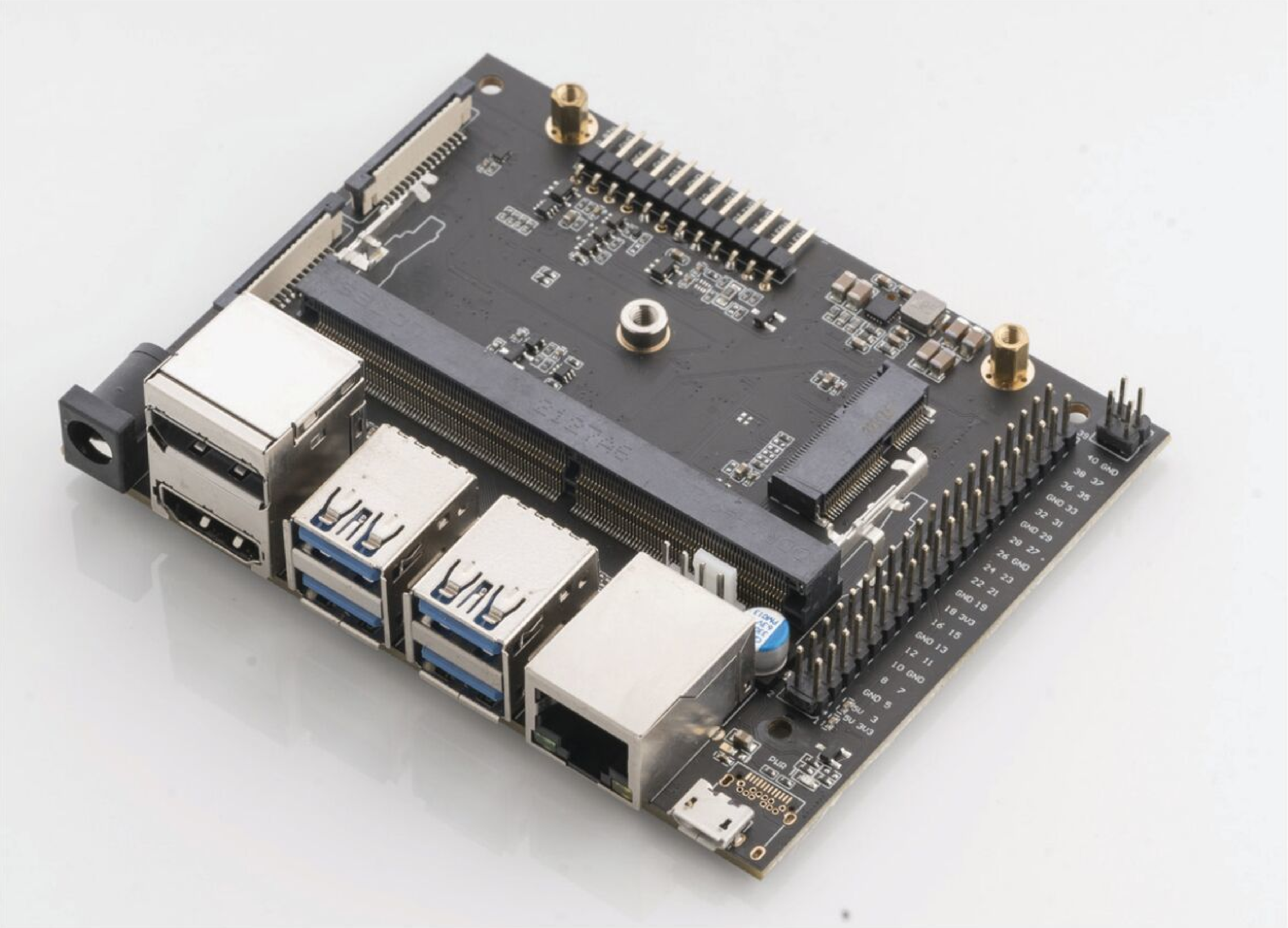


Eagle 101 Nano Based Full System

- Fully supported NVIDIA® Jetson Nano™ Module
- 1x GbE, 4x USB 3.0, 1x 4Kp60 HDMI output
- 1x DP stacked outputs
- 2x2 Lane MIPI CSI-2
- 1x4 Lane MIPI CSI-2
- 40-pin Expansion header
- 1x micro-SD card slot

Eagle 101 Carrier Board

- 1x GbE, 4x USB 3.0, 1x 4Kp60 HDMI output
- 1x DP stacked outputs
- 2x 2 Lane MIPI CSI-2
- 1x4 Lane MIPI CSI-2
- 40-pin Expansion header
- 1x micro-SD card slot



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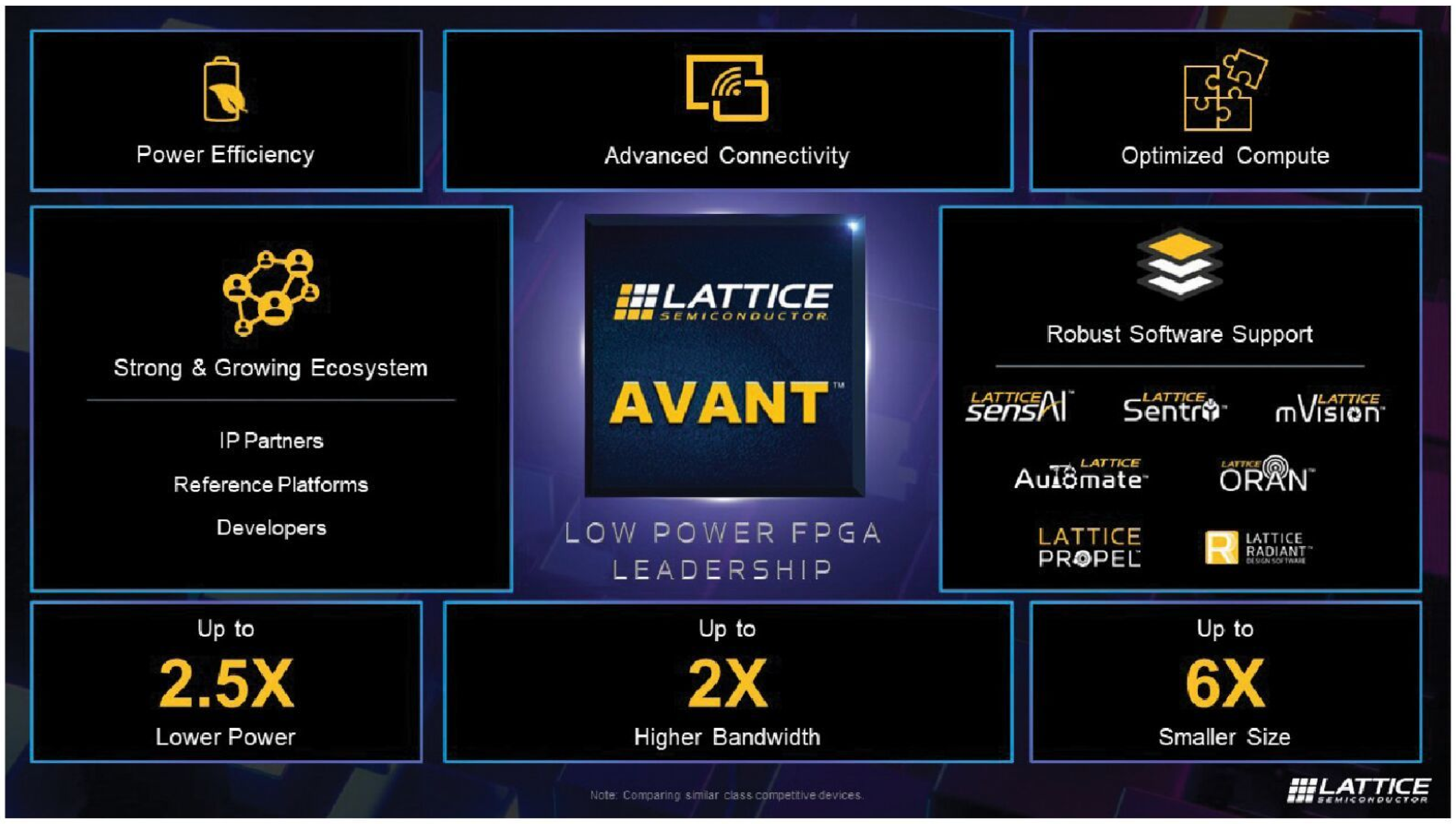
Taking Low Power to New Heights – Lattice Avant™ FPGA Platform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Companies today are challenged by a fast-evolving technology landscape, a seemingly insatiable hunger for more connectedness and intelligence, and an explosion of data generated at the Edge. Moreso than ever before, system designers and developers need efficient and flexible processing solutions that can keep pace with this accelerated demand for innovation.

These customer needs are what inspired Lattice Semiconductor to create the Lattice Avant™ platform, extending the company's low power leadership to span the small and mid-size density FPGA portions of the market.

Advancing FPGA Innovation

Architected from the ground up, Lattice Avant will enable designers with the power efficiency, performance, and small size leadership they know and expect from Lattice, with advanced connectivity and optimized compute capabilities at higher capacities than previous Lattice devices. This enables Lattice to address a broader set of customer applications than ever before.

A Closer Look at Lattice Avant

The Lattice Avant platform is designed at every level to deliver power efficiency, advanced connectivity, and optimized compute capabilities not previously available in mid-range FPGAs. While there is a lot of innovation worked into the platform, key architectural highlights include 25G SERDES and parallel I/O standards that address a wide variety of interface, and external memory interface support including DDR4, DDR5, and LPDDR4 along with legacy standards.

Addressing Key Customer Needs

Lattice Avant was born out of customer demand for compelling mid-range FPGA solutions for Communications, Computing, Industrial, and Automotive applications. When discussing their needs, it became clear that they were increasingly concerned with three key things: power efficiency, performance, and form factor – which aligned perfectly with what Lattice does best.

As compared to existing FPGAs serving the mid-range FPGA segment, Lattice Avant features:

- Market-leading power efficiency with up to 2.5X lower power helping system and application engineers achieve power and thermal design efficiencies, improve operating costs, and enhance reliability
- Best-in-class performance delivering up to 2X faster throughput providing increased bandwidth and enabling reduced number of SERDES links, system cost and size.
- Industry leading form factor offering up to 6X smaller package sizes to enable size efficient system designs

Lattice Avant will leverage existing Lattice software solutions and application-specific solution stacks they're already know and understand. This familiarity will help reduce adoption time and accelerate development.

The Lattice Avant platform is architected for scalability that will enable the rapid development of multiple new device families, available today with the Lattice Avant™-E FPGA family. Lattice Avant-E FPGAs are designed to solve key customer challenges at the Edge by combining class-leading power efficiency, size and performance with an optimized feature set tailored to the needs of Edge applications like data processing and AI.

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To learn more about the Lattice Avant platform, visit the platform page: www.latticesemi.com/AvantPlatform

PRODUCT SHOWCASE

optimus RHINO 5G Mobile

optimus rhino 5G

The global 5G mobile from India

OptimusLogic, is India's 1st 5G Smartphone Startup, who has built India's 1st global 5G Mobile, "**Optimus Rhino 5G 1**", in association with **IIT Hyderabad**, supported by TCoE, DoT, Govt. of India under DCIS-2022 scheme. Our Hon'ble PM of India, **Shri Narendra Modiji** Launched 5G services in India on 1st October 2022 at the India Mobile Congress (IMC2022) at Pragati Maidan, Delhi, where **Optimus Rhino 5G 1** became the 1 st phone in India to work from Day 1 on 5G, ahead of all leading mobile brands in India. To have the Indian brand "Optimus Rhino" create history represents the confidence of Aatmanirbhar Bharat!

OPTIMUSLOGIC
DEFEND • CONNECT • CONSERVE
optimus rhino 5G
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optimus RHINO 5G Mobile

Optimus Rhino 5G 1 Features:

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- Android 12 with upgrade support for next 3 years
- 8GB RAM, 128 GB Flash with additional SD card support
- Dual Sim, Dual 5G support, 2G/3G/4G/5G supported
- Mediatek 900 Platform with Octa-core Processor for balanced performance
- 171*78.3*9.0mm with 220g
- Quad Rear Camera setup with 64M + 8M + 2M + 0.3M, Front 24MP Camera
- GPS with NAVIC Support for India
- Dual Band Wi-Fi + Bluetooth 5.1
- 5000 mAh Li-Polymer Battery

The **Optimus Rhino 5G 1** is the 1st member of Optimus Rhino family with latest 5G technology, to be available globally in March 2023, at an expected Street price in India of 19999 (250 US$ for global markets).

While the **Optimus Rhino 5G** is being manufactured in factories in India, The **Optimus Rhino 5G** will feature a modular design that can be assembled by any end customer, with an age as less as 8 years to 100+ years, from anywhere across India, from villages to cities, without any prior knowledge and education. All is needed is our Rhino 5G kit, dedication for few hours and patience to follow instructions in any language. This experience will energise the country towards building an Aatmanirbhar Bharat for global leadership.

OptimusLogic Systems, since 2013, with operations in Hyderabad & Bengaluru in India, is a growing global Original Device Manufacturer (ODM) and Independent Design House (IDH) in India, for Mobile & Wearable AI systems, Industrial IoT solutions, Signal Intelligence Radars, and Ad-hoc Radios along with contributions towards open-source RISC-V chipsets with eFPGA.

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Please contact us at:
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Phone: +91-9606706303 (Call / WhatsApp / Telegram), **Web:** www.optimuslogic.in www.optimusrhino5g.com

Prodigy PCIe Gen3/4 Protocol Analyzer

Prodigy Technovations Pvt. Ltd, a Bangalore-based company, introduces its PGY-PCIeGen3/4-PA PCIe Protocol Analyzer supporting 2.5, 5.0. 8.0 and 16GT/S speeds. PCIeGen3/4 Protocol Analyzer is used for development and validation of PCIe interface for M.2, U.2 and Embedded PCIe Bus. Engineers in mobile, automotive and 5G network use this product to debug the protocol layer design problems in PCIe. PGY-PCIeGen3/4-PA provides industry best solution to simultaneously monitor and decode PCIe traffic at 2.5GT/S to 16GT/s and supports protocol decode and analysis of TS1, TS2, DLLP and TLP packets. Detailed LTSSM view is provided to help the designers to see PCIe state machine transitions.

Prodigy
PGY-PCIe Gen3/4- PA | Prodigy PCIe Gen3/Gen4 Protocol Analyzer
Prodigy
PROBE PWR
1
2
3
4
5
6
RESET
IN
TRIGGER
OUT

PGY-PCIeGen3/4-PA Software does industry best decode and analysis of deep memory PCIe traffic saving debug time. Designers can quickly select and view the parameter of interest in the TS1, TS2, DLLP or TLP packet. Separate decode and analysis view of configuration packets exchanged between root complex and end point. Current generation Software GUI with multiple floating windows and flexibility to view the required packet content makes it easy to debug the design issues with flexibility to hide and unhide the columns. LTSSM Analysis in software provides graphical representation of different states of protocol layer along with substate information.

PGY-PCIeGen3/4-PA Protocol Analyzer provides 64GB memory depth to capture the x4 link traffic. PCIe Protocol Analyzer supports trigger on content of the protocol packets and if-then-elseif multi-level trigger capability. This enables engineers to capture protocol details around the trigger condition and monitor PCIe bus over a long period of time.

Key Features:

- Simultaneous Protocol analysis of 2.5, 5, 8, and 16GT/S Protocol Traffic
- Acquisition memory management to capture protocol traffic using trigger, segmented memory, circular buffer and hardware filters
- Responsive software to analyze long captures with LTSSM view
- Active M.2, U.2 interposers and Solder down and custom probing Solutions
- Simple and advanced Trigger based on TS1, TS2, DLLP and TLP Protocol packet content

Prodigy UFS4.0 Protocol Analyzer

Prodigy
PGY-UFS4.0-PA MPHY, UniPro, UFS3.1/4.0 Protocol Analyzer
Prodigy
TX
CH1
CH2
CH3
CH4
PROBE PWR
RESET
TRIGGER

Prodigy Technovations Pvt. Ltd, provides PGY-UFS4.0-PA M-PHYSM, UniPro®, UFS4.0 Protocol Analyzer for development and validation of next generation flash memory UFS 4.0 at 23.2 Gbps per lane interface for 5G, Mobile, Automotive, IOT, AR/VR applications. PGY-UFS4.0-PA is the leading instrument that enables the design and test engineers to test the UniPro and UFS3.0 designs for its specifications. PGY-UFS4.0-PA is backward compatible with UFS2.0/2.1/3.0 and 3.1 specifications.

Deep Capture, Powerful Trigger capabilities and In-depth Analysis views give unprecedented insight into Universal Flash Storage 4.0, UniPro® and M-PHYSM Protocol layers. Multilayer View in PGY-UFS4.0-PA, provides the complete view of M-PHYSM, UniPro® and UFS Protocol activity in a single GUI. User can easily correlate protocol activities between protocol layers for quick debugging and finding the cause for protocol errors. User can set different trigger conditions to capture specific protocol activity and decode the communication between UFS4.0 Host and Device. Decoded data is displayed in symbol, UniPro and UFS layer packets. Error report provides the summary of different types of protocol errors in millions of protocol packets.

Key Features of PGY-UFS4.0-PA M-PHYSM, UniPro® and UFS4.0 Protocol Analyzer:

- Flexibility to capture very large data using continuous streaming of Protocol data
- Soldered-down active probe and custom designed probes provide high signal fidelity
- Real Time Protocol decode with error analysis
- Trigger based on MPHY, UniPro, UFS layer packet content
- MPHY, UniPro and UFS layer Protocol Decode
- Powerful search and Filter capability

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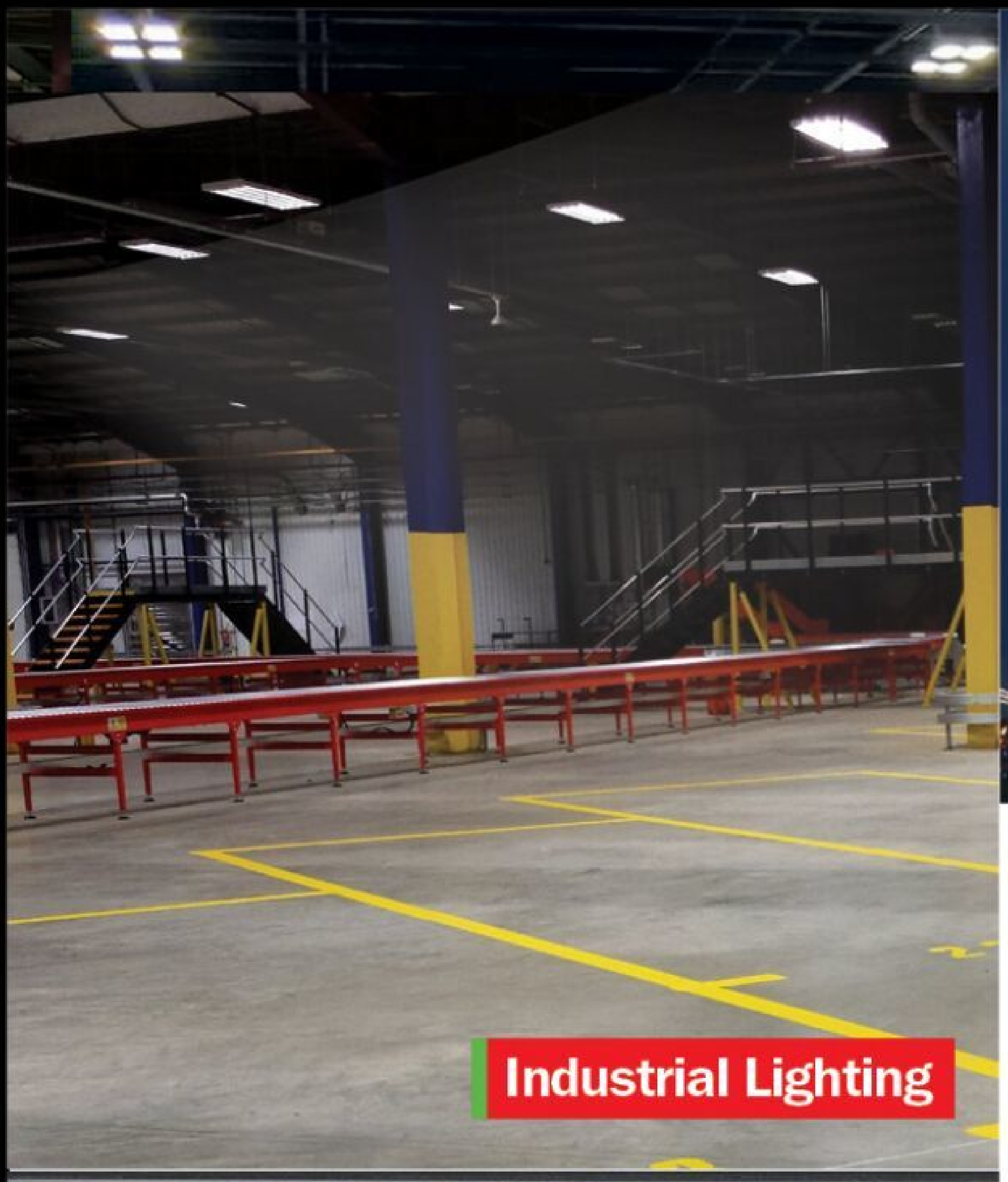
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